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ABSTRACT

This paper provides curriculum makers with an overview of developmental theory and relates the theory to instructional strategies. The section on socioemotional development addresses Erikson's eight ages of man, Kohlberg's stages of moral development, motivation and Maslow's hierarchy of needs, Taylor's stage model of creative development, and Loevinger's stages of ego development. Cognitive development is approached through overviews of Skinner's operant conditioning, Gagne's behavioristic-eclectic theory, Bandura's social learning theory, cognitive gestalt-field theories, Lewin's cognitive field theory, Bruner's learning as categorizing theory, Piaget's cognitive-descriptive theory of intellectual development, the information-processing approach, and Case's comprehensive framework of intellectual growth. Personal- and social-oriented instructional strategies discussed include Gordon's synectics, Schutz's awareness training model, the classroom meeting and laboratory training (T-Group) models, the Shaftels' role-playing model, and cooperative models of instruction. Behavioral strategies include mastery learning, individually prescribed and direct instruction, and contingency management. Information-processing strategies include concept attainment, inductive thinking, inquiry techniques, the advance organizer and memory models, and the process of Piagetian clinical interviewing. A total of 66 references are cited. (RH)

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SASKATCHEWAN INSTRUCTIONAL DEVELOPMENT & RESEARCH UNIT

ED319482

DEVELOPMENTAL THEORIES AND INSTRUCTIONAL STRATEGIES: A Summary Paper

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DEVELOPMENTAL THEORIES AND INSTRUCTIONAL STRATEGIES: A SUMMARY PAPER

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and
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by
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Purpose:
It is generally acknowledged that four basic areas of knowledge form the foundations of curriculum. These are: 1) Philosophy, 2) Society and Culture, 3) The Individual, and 4) Learning Theories. The mandate of the present paper is twofold: First, it is to provide the curriculum maker with brief sketches of theoretical positions relating to the two last categories. Second, it is to relate these theoretical foundations to instructional strategies. It is realized that most of the information contained in this paper will be familiar to the reader, at the same time, it is believed that a condensed summation of this information might be helpful.

In line with the stated purpose of a brief summary, both the choice of material covered, and the individual treatment of theories are not intended to provide the reader with <u>all</u> important aspects of the subject matter, but rather point to some particularly pertinent theoretical viewpoints and their possible implications for the curriculum.

Organization:
In <u>Part I</u> of this paper the reader is provided with a "quick sketch" of some theories of human development dealing with the social-emotional and the cognitive domain. Charts at the end of this section give an overview of relationships of various theories to each other and to broad age groups.

In <u>Part II</u> the reader is reminded of some useful "hands on" instructional strategies. Each strategy is described and put into theoretical, practical and, where applicable, age context. Finally, a summary provides an overview of relationships between teaching strategies and theoretical views.

PART I DEVELOPMENTAL THEORIES

Introduction:
Professionals and laymen alike are aware of the fact that children at different age levels have ever-changing patterns of abilities, behaviors, needs, and styles of understanding their environment. Developmental theories have tried to describe and understand these changing patterns.

It is sometimes (falsely) assumed that the description of these processes is based on neutral and objective observation which therefore will result in the accumulation of facts that will lead to one valid and true interpretaton of development. It has to be realized, though, that even direct observation is guided by some selection processes on the part of the observer; a selection based on previous explicit or implicit assumptions. Depending on these assumptions some facts are chosen for recording and others are ignored. Based on the same assumptions the selected facts are then interpreted. Thus, based on the same set of "facts", a child may be viewed as seething with sexual energy, as a human being filled with the drive to fulfill his/her urge to actualize the self, or as a bundle of conditioned responses.

This example illustrates that different theoretical assumptions about human nature in general and developmental processes in particular may have wide ranging implications for educators and curriculum makers. Theoretical understanding of developmental processes will influence instructional design, curriculum content, as well as teaching methods.

The following selection of theoretical viewpoints is not presented here with the assumption that readers should choose one theory or the other as "their" theory, rather, it is believed that all viewpoints, both older and more current, might be utilized eclectically to facilitate "best fit" between various goals of education, student characteristics, teacher characteristics, and content requirements.

1 SOCIAL EMOTIONAL DEVELOPMENT

Definitions of the concept of "emotion" are vague and varied. Different theories, therefore, often address different central issues which are not necessarily inconsistent with one another but rather complement each other. While some theorists view emotional development as being mainly internally determined, others focus on social factors when explaining psychological development. The present chapter looks at some representative theories dealing with life-stages, moral development, creative development and motivation.

1.1 ERIKSON'S EIGHT AGES OF MAN

Erik Erikson, building on Freud's theory of psychosexual personality development, developed his psychosocial theory of life-stages. His theory, in contrast to Freuds', which emphasized pathology, focuses on healthy personality development. This development, again in contrast to Freud's theory, is greatly affected by social influences.

But despite these social influences, the basic sequence and general make-up of the psychosocial stages are postulated as being largely innately determined. The child and later the adult ideally pass through each of these stages at certain predictable times in the lifespan.

Erikson's theory centres around the acquisition of identity which is seen as the self in relationship to one's society. He sees this identity as being redefined in each stage - with each successive stage being influenced by earlier stages.

The movement from one stage to the next is conceptualized as "crisis" during which fundamental issues have to be resolved by the child and later by the maturing individual. It is postulated that a good measure of success at each level is a prerequisite for success at each subsequent stage. Despite this strict requirement Erikson's theory represents an optimistic view of human development since it is assumed that it is never too late to resolve any crisis.

Each crisis is described in terms of a dimension with both positive and negative possible results. In the process of healthy development the positive outcomes should outweigh the negative ones. For example,

though children have to learn to mistrust in certain situations, generally a trusting attitude should be established.

Successful resolving of childhood "crises" is important, for if they are not accomplished satisfactorily, these issues will have to continue to be "battled out" in later life, thus hindering successful achievement of later stages of identity.

Since it is assumed that the reader is familiar with Erikson's theory, Table I showing a brief summation of the "Eight Ages of Man" and their main characteristics, is provided to recapitulate the main points of the theory.

According to Erikson, then, if development is proceeding at a healthy pace, the first three stages provide the psychological foundation for the child's identity when he/she enters school. During most of the elementary years, stage four is being accomplished by most children. During the late elementary years most children are beginning to move into stage five which generally characterizes students' social emotional concerns during the remainder of their school years. The educational system, therefore, should provide both the affective climate and the content to facilitate successful movement through these developmental crises. It has to be kept in mind though, that due to unfavorable home and other environmental influences, many children in the early years of elementary school and even beyond, are still struggling with some important issues of earlier crises.

Generally, though, as children begin school they are starting to enter the "industrious age" meaning that they come with a desire to explore the larger world of knowledge and work. If the child is supplied with many opportunities to exercise this urge to do and learn, the sense of industry, a feeling of mastery and competence, which is gained in that period ideally will result in a healthy self image. This positive self concept will help to reduce the stress of the subsequent stage of "identity crisis," a term Erikson coined to describe the period of adolescent struggle with the question of "Who Am I?"

Despite its many useful aspects, Erikson's theory has not been without its critics. For example, the theory has been accused of being "sexist" in its discussion of (or lack of) women's development.

Table I: Erikson's Eight Ages of Man

Approximate Age	Name of Psychosocial Crisis	Events Facilitating Development	Virtues Gained From Each Crisis
0-1 Infant	I Trust versus Mistrust	quality of early nurturing experience	- Hope - the belief that wishes can be fulfilled
2-3 Toddler	II Autonomy versus Shame and Doubt	start of the ability to walk degree of appropriate balance between firmness and permissiveness	- Will - the determination to exercise both free choice and self restraint
3-6 Preschooler	III Initiative versus Guilt	widening social circle feedback from outsiders about abilities	- Purpose - The courage to envisage and pursue goals
7-12 Elementary School Age	IV Industry versus Inferiority	school-start of formal preparations for adult life increasing responsibilities	- Competence - The free use of skill and intelligence
12-18 Adolescent	V Identity versus Identity Diffusion	rapid physical growth and new sexual desires peer relationships challenging of adult authority	- Fidelity - sustaining freely pledged loyalties
The 20s Young Adult	VI Intimacy versus Isolation	beginning to find a place in adult world events centering around love and work	- Love - mutuality of devotion
20s to 50s/60s Middle Age	VII Generativity versus Self-Absorption	years of productivity raising of children contribution to society	- Care - concern for obligations
60s and beyond	VIII Integrity versus Despair	increasing dependence on others decreasing productivity approaching life's end	- Wisdom - detached concern with life itself

1.2 MORAL DEVELOPMENT

Another area of social-emotional development, which impacts on education, is moral development. Questions revolving around moral reasoning have been central to philosophical thought since antiquity. Two modern theorists have dealt with this issue in developmental and educational terms. The first was Piaget, who described three levels of moral reasoning; the Preconventional, Conventional, and Postconventional levels. The second theorist, Lawrence Kohlberg based his own theory on Piaget's general assumptions and method but advanced it to propose his stage theory of moral reasoning.

Kohlberg defined moral reasoning in terms of judgement about justice, viewing the child as a philosopher in the process of constructing meaning around universal questions of fairness. This reasoning, according to Kohlberg, progresses through an invariant sequence of six stages of increasing cognitive complexity. Both the stages and the sequence are seen as cultural universals. This is possible, despite the fact that different cultures foster different values, because Kohlberg's stages are not based on specific values, but rather on the underlying modes of reasoning. These modes of reasoning in turn also are believed to apply cross-situational. In other words, children in stage two, for example, will apply the "look out for number one" reasoning to most of their "moral dilemmas."

Movement from Stage to Stage:
According to Kohlberg, the movement to higher stages is advanced through interactions which challenge children's assumptions about their sense of right and wrong. These interactions are what provokes the child to develop more comprehensive positions on questions of moral reasoning. Although these interactions may arise spontaneously, some research has shown that moral development can be advanced if the school provides opportunities for thinking about and for discussing moral issues.

Table II provides brief summations of Kohlberg's three principal levels and his six stages of moral development. The reader must be cautioned with regard to the "typical age levels" which are provided in the table. These age levels are by no means universal. In fact, a majority of people in our culture do not reach postconventional moral reasoning and only a few indeed ever fully reach stage six. Nevertheless, the age levels

provided may serve as a guide for potential transition times from one to the next level.

Implications for Education:

- Moral reasoning may be advanced through classroom discussion of "moral dilemmas" (better than through "preaching" or punishment).

- Since generally individuals cannot comprehend moral reasoning which is more than one stage above their own, instruction has to be geared to the student's level of moral development.

- Programs can be designed specifically to stimulate moral growth by providing opportunities for appropriate social interaction.

- High level moral reasoning cannot be expected from very young children.

Table II: Kohlberg's Stages of Moral Development

Typical Age Level	Level of Moral Development	Stages of Moral Development
2 - 9 years	Level I: PRECONVENTIONAL MORALITY - responsiveness to cultural values of good/bad, right/wrong - reasoning and actions are directed by fear of punishment or desire for rewards - submission to power	Stage 1: PUNISHMENT & OBEDIENCE ORIENTATION Moral decisions are based on avoiding punishment.
		Stage 2: RELATIVISTIC HEDONISM Right is what satisfies one's own needs, "look out for number one" attitude.
9 - 15 years	Level II: CONVENTIONAL MORALITY - moral reasoning guided by expectations of family, group or nation - concern for conforming to and maintaining existing order	Stage 3: GOOD BOY/GOOD GIRL ORIENTATION Moral decisions are based on conforming to social norms. Existing norms are accepted unthinkingly.
		Stage 4: LAW AND ORDER ORIENTATION Moral behavior is dictated by one's duty to obey law and order. Social order is seen as worth maintaining for its own sake.
16 years & above	Level III: POSTCONVENTIONAL MORALITY - defining of personal principles in terms of universal validity - these personal principles may be placed above existing social order and/or laws	Stage 5: SOCIAL-CONTRACT ORIENTATION Beyond what is constitutionally agreed upon, right or wrong is a matter of personal values.
		Stage 6: UNIVERSAL PRINCIPLES ORIENTATION What is right is defined according to the individual's conscience. Self chosen universal principles are seen as more important than existing laws.

1.3 MOTIVATION AND MASLOW'S HIERARCHY OF NEEDS

The subject of motivation, namely of what compelled people to behave in a certain way, has been studied by many theorists. Conclusions about the origin of motivation fall into two major orientations; one seeing motivation as resulting from extrinsic forces, the other viewing motivation as an intrinsic process originating within the individual.

The extrinsic orientation is typical of behavioristic psychology. In this view motivation (e.g. to learn) is mainly achieved by externally provided rewards. The intrinsic orientation, on the other hand, sees behavior as motivated from within the individual. Jerome Bruner, for example, described four major intrinsic motives: curiosity, desire for competence, aspiration to emulate a model, and a commitment to social reciprocity. Bruner felt that although external rewards may be helpful in initiating some behaviors, only through intrinsic motivation is the will to learn sustained.

Educators views about motivation have important implications for instruction. If we believe that extrinsic motivation is the major force underlying behavior, we have to plan instruction in such a way that appropriate external rewards are incorporated into our instructional design. If, on the other hand, we believe that learning is mainly based on intrinsic motives, we need to provide a learning environment which gives students enough freedom so that their own curiosity and desire for competence is not stifled.

From observation it seems that most learning involves both intrinsic and extrinsic motivation. This motivational interplay was recognized, among others, by Abraham Maslow in his "Hierarchy of Needs Theory."

Maslow's Hierarchy of Needs:
Maslow's theory of motivation views individuals as passing through different phases of needs on their journey toward self-actualization. Human motivations, according to Maslow, are hierarchically organized into a sequence of five qualitatively different needs. Each of these needs, in turn, dominates the individual's motives until satisfied and then fades in importance to give way to the next need on the hierarchy. In other words, higher order needs are generally not attended to until lower order needs are satisfied, at least to some reasonable level.

According to Maslow, then, the most basic human needs are physiological; needs which, if not fulfilled will seriously threaten survival. Until these needs are adequately satisfied, they will be the main force motivating behavior. Then follow needs for a secure, predictable environment or safety needs. Only after these first two have been gratified to a reasonable extent, needs for love and belongingness will emerge as the main motivators. Once relationships which provide this sense of love and belongingness have been established, needs for self-respect and respect of others, esteem needs, will provide the main motivational impetus. Finally, only after all other needs are basically satisfied, self-actualizing needs will emerge. These needs propel people to strive to live up to their full potential. Self-actualizing needs may manifest themselves in the desire to learn for its own sake, to seek understanding, and to create. In fact, Maslow felt that self-actualization and creativity were inseparable.

It is important to realize that all levels of needs are present in everyone simultaneously in a latent state, with the sequence of needs arising from the strength of each need as it dominates the conscious mind in turn. It is further important to realize that an individual's current stage of needs should not be used to place any value judgement on "appropriate" development, since advancement, especially through the lower motivational levels, depends heavily on socio-economic and other circumstances related to the environment the child is growing up in.

Implications for Education:

- A continuous process of needs diagnosis is important in order to best match students motivational stages and learning experiences.

- One goal of instruction should be to take students from their current motivational level and move them toward self-actualization.

- Students whose lower needs are not fulfilled will require more extrinsic reinforcement for learning.

- Students at the higher motivational levels can function more independently and require more freedom to self-direct their learning experiences. Their primary intrinsic motivators are: curiosity, a desire for competence, and the drive for self-actualization.

- In most classrooms learning experiences need to be provided for students in, both, the lower and higher levels of the motivational hierarchy.

1.4 CREATIVE DEVELOPMENT

The fostering of creativity has for quite some time been one of the objectives of our schools (even if, at times, more in the form of "lip-service" than in actual fact). Recently, though, the advancement of creative thinking has gained renewed importance through its status as one of the "Common Essential Learnings" in the 1986 Programs Policy Proposals of the Core Curriculum Advisory Committee.

The term creativity has been used to describe such things as specific cognitive abilities, creative production, as well as personality traits. As we saw in the previous section, Maslow linked creativity to self-actualization. He contrasted this type of creativity to, what he called, special-talent creativity. In his view, therefore, creativity is essentially a combination of personality characteristics. Special-talent creativity, on the other hand, is the kind of creativity which leads to the creation of artistic or scientific products. The third aspect of the term creativity is related to special abilities which are believed to be essential for creative thinking. Here creativity is viewed as a cluster of specific cognitive abilities. The most prominent among theorists in this approach is J.P. Guilford. In his three-dimensional model of the Structure-of-Intellect he isolated the "Divergent Production" abilities as those most important for creative thinking.

This chapter will briefly outline some characteristics of creativity related to the three aspects of creativity. It further will point to some more recent attempts to see creativity as a phenomenon which undergoes developmental changes during the life span.

Creative Personality Characteristics:
The view of creativity as a personality disposition, has been strongly associated with the humanistic school of psychology, and in particular with Maslow. During the course of his study of self-actualized people, he came to realize that the concepts of self-actualization and creativity are intimately related, if not indeed the same thing. He compiled a list of personality characteristics which described self-actualizing people. These characteristics will be provided here since they are also typical of the creative personality. The reader will realize that commonly used instructional practices foster some of these traits but often neglect many others.

Maslow's Characteristics of Self-actualizing Individuals:

- accurate perception of comfort with reality
- acceptance of self, others, and nature
- spontaneity
- problem centering
- need for privacy: quality of detachment
- autonomy: relative independence of culture and environment
- freshness of appreciation
- peak-experiences
- a feeling of community and brotherhood
- deep interpersonal relationships
- democratic character structure
- unhostile sense of humor

Many of these characteristics correspond to Kohlberg's highest levels of moral reasoning, others are related to a sense of cooperativeness and fairness, and again others relate to spontaneity and freshness of thought. These three clusters of creative personality will be addressed in Part II by specific instructional strategies.

Although the first part of this section dealt with the emotional side of creativity, creative development does not fit "neatly" into either social-emotional or cognitive theory since it covers both aspects of development.

Creativity as Cognitive Traits:

J.P. Guilford's work spanning over two decades, provides valuable insights into the cognitive abilities which are believed to be essential for creative functioning. His three-dimensional model of the Structure-of-Intellect originally conceptualized the mind as a cube with 5 x 4 x 6 = 120 cells. It was recently updated to include 150 cells. The three dimensions of this model are labelled as "Operations," "Contents," and "Products" with each of these dimensions divided into several subcategories. Within the operations dimension (operations being processes the mind performs with given information) the subcategory of "Divergent Production" proved to be the typical mode of processing in creative thought. Divergent production refers to the ability to generate a large variety of information from any given stimulus. In other words, it is the ability to respond not just with "the one convergently correct" answer, but to dream up many different alternative solutions. In order to be able to produce divergent responses, the individual must possess fluency

and flexibility of thought so that elaboration can occur. Guilford's studies further pointed to "Transformation Abilities" (a subcategory of the "Product" dimension) as being essential for creative thinking. These abilities allow the individual to redefine or make other kinds of changes to given information - a kind of freedom from fixedness.

Creativity Throughout the Life Span:
More recently research began to look at creativity as a phenomenon which undergoes transformations and metamorphosis during the lifetime. Earlier research, which had focused on measurable creative products of prominent individuals had generally concluded that creative production peaks around age 30 and then invariably declines. The newer, developmental approach to creativity focuses on the process of creative behavior rather than on the final product. It seeks to shed light on the different sources of motivation for creativity as well as on the different forms which creativity might take during the life span. Taylor (1974), for example, devised a five stage model of creativity development which is provided in Table 3.

These stages, then, point to qualitatively different stages of creativity with differing goals and typical activities. These stages ought to be considered by teachers and curriculum developers to gear creative activities to the appropriate stage of creative development of students.

Implications for Education:
- Although research has shown that creative personality characteristics in students are not always appreciated by teachers, enough variety in instructional approaches should provide opportunities for such characteristics to blossom.

- Creativity in the cognitive domain (e.g. divergence, flexibility, fluency, and idea generation) need to be fostered, both, via curriculum content and instructional strategies.

- Awareness of developmental stages in creative growth should guide both content of instruction and teacher expectations.

Table III: Taylor's Stage Model of Creativity

Stage	Approx. Age	Typical Type of Activity
I Expressive Spontaneity	until about age 6	children's spontaneous art, dance, expressive games, impromptu language
II Technical Proficiency	7 - 12	interest in refinement: e.g. detailed drawings, replicating intricate movements, skill development
III Inventive Ingenuity	13 - 20s	isolated skills are combined creatively, various areas of interest are associated inventively
IV Innovative Flexibility	late 20s - late 30s	basic ideas are modified creatively for one's own purpose
V Emergentive Originality	40s and beyond	synthesizing of all previously acquired skills and insights to create new and original breakthroughs

* Adapted from: Baldwin, Colangelo and Dettmann (1984)

1.5 STAGES OF EGO DEVELOPMENT

Jane Loevinger's (1976) work synthesized ideas from many different sources and theories into her comprehensive stage theory of "Ego-Development." Both the word "ego" and "stage" need defining in this context.

Ego:
Loevinger understands ego not in the psychoanalytic sense but uses the word to describe the sum total of character structure which includes: moral development, socialization components, and cognitive development. Loevinger's "ego" is comparable in inclusiveness to Adler's "style of life" in that it refers to such complex phenomena as: the individual's unique method of approaching problems, opinions about self and others, and attitudes toward the whole of life.

Stages:
Loevinger's stages of ego development are not conceptualized as being age specific, although she concedes that there might be earliest, latest and optimal ages for the transition from one to the next stage. Nevertheless, she makes a point of <u>not</u> referring to age levels in discussing individual stages.

Description of Stages:
The first two stages, the <u>Presocial Stage</u> and the <u>Symbiotic Stage</u> occur before language development. The essential task of both these stages is the differentiation of the self from the environment. If the child does not advance beyond the Presocial stage at an appropriate age, the child is referred to as autistic.

During the <u>Impulsive Stage</u>, the child is aided by his own impulses and the emerging language development (e.g., "No," "Do it by myself") to affirm a separate identity. Children in this stage have intense emotions and are entirely present oriented. Their cognitive style is one of "conceptual confusion." If a child remains inappropriately long in this stage it may be labelled as "uncontrollable." Such a child will see the cause of his problems as related to place rather than to the situation or his own behavior (e.g., run away from home, school, etc.).

During the <u>Self-Protective Stage</u> children make the first step toward controlling their impulses by learning to anticipate immediate, short-term rewards or punishments. At this time children are very vulnerable and guarded. They are aware of the existence of rules, but the main rule guiding their behavior is "Don't get

caught." Blame, at this stage, is externalized to other people and circumstances. If ego development has not proceeded beyond this stage, we see the older child or adult who is opportunistic, deceptive, and preoccupied with the control of others.

Entering the Conformist Stage represents a major developmental step. Here the child starts to realize that his/her own welfare is intertwined with the welfare of the group (family, peer group, etc.). Rules, now, are obeyed not out of fear, but simply because they represent group standards. Consequently, group disapproval is one of the most potent sanctions at this stage. The Conformist likes and trusts people in his own group, but "outsiders" are generally mistrusted and rejected. Stereotyping by sex, age, nationality, etc. is characteristic of this stage. Right and wrong are seen as absolutes; the same thing is always right for all people. Inner life is seen in rather simplistic terms of happy and sad, good and bad, joy and sorrow, etc. Obviously, when this stage persists into adulthood we see individuals who are given to moral cliches, who may be faithful members of extremist groups, and who tend to be inclined toward racism.

The Self-Aware Level is the transition from the Conformist Stage to the Conscientious Stage. Transition here is referred to in a theoretical sense since the Self-aware level seems to be rather stable and probably describes the majority of adults in our society.

The Self-aware person is different from the Conformist in two essential ways: an increase in self-awareness, and an ability to appreciate multiple possibilities. These two main differences, then, allow for the gradual replacement of rigid group standards with self-evaluated ones. Although allowances for individual differences are made at this stage, these are still in terms of stereotypic, demographic categories (age, sex, marital status, race, etc.).

At the Conscientious Stage "adult conscience," essentially, is characterized by long-term self-evaluated goals and ideals, differentiated self-criticism, and a sense of responsibility. A few persons as young as thirteen or fourteen may reach this stage. Further characteristics of this stage include: internalization of rules, aspiration to achieve as best as one can, conceptual complexity, rich differentiated inner life, understanding of alternative points of view, deeper interpersonal connections, and the viewing of events in their broader social context.

The Conscientious Stage is followed by the Individualistic Level which represents the transition to the Autonomous Stage. The Individualistic Level is characterized by a heightened sense of individuality and a concern for emotional dependence. In other words, intensive interpersonal relations are now seen as partly antagonistic to the striving for achievement and independence.

The Autonomous Stage brings the ability to successfully cope with conflicting roles, conflicting needs, and conflicting duties. This stage is characterized by a high tolerance of ambiguity, and the recognition of the autonomy of others. Autonomous individuals further realize emotional interdependence is inevitable. Abstract, broad social ideals are held and self-fulfillment becomes an important goal.

Rare individuals, finally, reach the Integrated Stage. In this stage the consolidation of a mature sense of identity is achieved, similar as it is described in Maslow's self-actualizing person.

Table IV summarizes the main characteristics of Loevinger's stages.

Educational Implications:
Although Loevinger does not directly refer to ages, it is apparent that certain stages are more typical of school aged children than others. For example: kindergarten might well be a time when the majority of children move from the Self-protective to the Conformist stage. The Conformist stage then seems to be typical for the majority of students at least through the elementary years. During the high school year more and more students advance into the Self-aware level and into the Conscientious Stage. Few students in the final high school years enter into the Individualistic Level. Only extremely rarely will we encounter students in the secondary level who have reached an even more advanced state of ego development.

The characteristic features typical of these stages, then, and the explicit effects of inappropriate advancement through the early levels, can serve as a guide for curriculum content, affective education and even shed light on some problems which require special education considerations (e.g., Autism and some behavioral problems).

Table IV: Loevinger's Stages of Ego Development

Stage	Charact. Develop.	Interpersonal Style	Conscious Preoccupation	Cognitive Style
Presocial		Autistic		
Symbiotic		Symbiotic	Self versus non self	Conceptual Confusion
Impulsive	Impulsive, fear of retaliation	Receiving, dependent exploitative	Godly feelings	
Self-Protective	Fear of being caught externalizing, blame, opportunistic	guarded, manipulative exploitative	Self-protection, things, advantage, control	
Conformist	Conformity, shame, guilt	Belonging, superficial niceness	Appearance, social acceptability, banal feelings	Conceptual simplicity stereotypes, cliches
Self-Aware	Differentiation of norms and goals	Self-awareness in relation to group, helping	Adjustments, problems, reasons, opportunities	Multiplicity
Conscientious	Self-evaluated standards, self-criticism, long-term goals	Responsible, mutual concern	Differentiated feelings, self-respect, achievement	Conceptual complexity

Table IV continued

Stage	Charact. Develop.	Interpersonal Style	Conscious Preoccupation	Cognitive Style
Individualistic	+respect for individuality	+Dependence as an emotional problem	+Development, social problems, differentiating inner from outer life	+Distinction of process from outcome
Autonomous	+coping with conflict	+Respect for autonomy, interdependence	Abstract social ideals, integration of physiological and psychological role conception, self-fulfillment	Increased conceptual complexity, tolerance for ambiguity, broad scope objectivity
Integrated	+Reconciling inner conflicts	Cherishing of individuality	+Identity	

+ means in addition to content of previous level

Adapted from: Loevinger, J. (1976) Ego Development: Conceptions and Theories (pp: 24/25)

1.6 SUMMARY OF SOCIAL EMOTIONAL THEORIES

The theories of development, which were discussed in this section, represent only some of the many theoretical viewpoints and descriptions of social emotional growth. Nevertheless, the reader will notice, especially when looking at the overview provided in Table V, that distinct, composite "portraits" of children in each of the developmental periods, across theories, emerge. Before highlighting some of these portraits, it must be cautioned again, that these typical pictures represent broad generalizations only, and that large variations in the pace of individual development are common.

Keeping this caution in mind, generally, as children enter Kindergarten, many of the characteristics which are typical of the preschool years, may be still either fully present or just beginning to change. The length and timing of this transition period varies individually, but for the majority of students it should be basically accomplished by about the end of grade one.

This transition, then, leads to the "pre-adolescent" (Table V) characteristics which are typical for the majority of children during most of their elementary school years. During this time, we see children with strong needs and desires to acquire technical mastery skills, and to be given increasingly more responsibility to try out and display these new skills. Emotionally, these children require to feel a sense of being loved and of belonging. In their interpersonal interactions, they are generally guided by a desire to conform to group norms. This conformism also directs their sense of fairness, with moral decisions about right and wrong being based, initially, on the good girl/good boy principle and later strictly on one's duty to obey existing law and order. The same general conformist attitude also translates to a preoccupation, with outward appearance (everybody has to look like everybody else in the "group"), which often leads to the adoption of stereotypes and at times to prejudicial behavior and attitudes toward members of other groups (minorities, opposite sex members, the aged, etc.). At the same time, the need to conform and to belong, and the unquestioning acceptance of existing "law," may lead to a desire to act "nice." Therefore, discipline problems, at this stage, are generally not as severe as they might be in the next stage.

The characteristics of the final years of elementary school and of the high school years are listed in Table

V under "Adolescent." The "typical" adolescent, then, is emerged in the "identity crisis" struggling with the question of "Who Am I." This young person is motivated by esteem needs, the needs to prove his/her own worth and to be recognized by others, especially the peer group. Moral decisions are now not any longer always guided by straight forward rules of law and order but may be based on personal, individual values. These individual values are formed, based on the newly gained insights of the multiplicity and complexity of life. Overall, this period is a time of intense emotional and cognitive changes, a time of questioning of self, society and values, with the ultimate goal of coming to "grips" with a personal identity. This time of emotional upheaval and restructuring may be fertile ground for new forms of inventive creativity and ingenuity. On the other hand, this time of change from the simplistic adopting of group norms to the complex defining of the self, also leads to much emotional vulnerability and, at times, to "discipline problems."

Overall, then, an awareness of the different facets of these changing stages with their typical patterns of social emotional growth, allows classroom teachers and curriculum developers alike, to gear curriculum content and instructional strategies toward these developmental milestones. It further should provide educators with enough oversight to see many possible "difficulties" in a developmental context as healthy, normal, and temporary phenomena, rather than as permanent "character" flaws.

Table V: Summary of Theories of Children's Social Emotional Development

Theory	Infant & Toddler	Preschool	Pre-Adolescent	Adolescent	Overall Goal of Development
Erikson Eight Ages of Man	Trust/ Mistrust Autonomy/ Shame	Initiative/ Guilt	Industry/ Inferiority	Identity/ Identity Diffusion	Toward - Identity Formation
Kohlberg Moral Development	Obedience/ Punishment	Relativistic Hedonism Good Boy Good Girl	Good Boy Good Girl Law and Order	Law and Order Social Contract	Toward - Universal Principled Morality
Maslow Hierarchy of Needs	Physiological Needs	Safety Needs	Love and Belongingness Needs	Esteem Needs	Toward - Self-Actualization
Taylor Creative Development	Expressive Spontaneity	Expressive Spontaneity	Technical Proficiency	Inventive Ingenuity	Toward- Emergentive Originality
Loevinger Stages of Ego Development	Presocial Symbiotic Impulsive	Self-Protective	Conformist Self-Aware	Self-Aware Conscientious Individualistic	Toward - Integrated Character Structure

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2 COGNITIVE DEVELOPMENT

This chapter explores the process of intellectual growth from a variety of theoretical perspectives. Although it is not easy to define learning in one all encompassing statement, differences in these theories do not stem from disagreement over the definition of learning, but rather from differences in the interpretation of the learning process. Three central questions are at the core of this division among theories:

- Does learning involve merely the acquisition of new habits, or does it involve the acquisition of new cognitive structures?
- Does learning happen by trial and error, or by insight?
- Is learning facilitated through forces internal to the learner, or are external factors the driving force behind the acquisition of knowledge?

The answers to these and other essential questions divide learning theorists into two conceptually and philosophically incompatible camps: the one guided by behaviorism, of which three theorists will be discussed here (Skinner, Gagne, and Bandura), and the one guided by cognitivism, which includes the Gestalt-field theories, Piaget's theory, and the Information-processing approach. The theories based on behaviorism focus strictly on observable and objective components of learning behavior, whereas those based on cognitivism are essentially concerned with the organization and processing of information and with questions of problem solving.

2.1 BEHAVIORISTIC THEORIES

The behavioristic view of learning suggests that all behavior, regardless of complexity, is made up of very basic parts, and that even the most complex whole is simply no more than the sum of these parts. Further, the assumption is made, that all behavior occurs as a result of stimuli, and that learning simply is the process of making the appropriate connections between stimuli and responses.

2.1.1 Skinner's Operant Conditioning

According to Skinner, theories might be a source of enlightenment to their creators, but are in fact of little practical value. Therefore, in his work he made no effort to fulfill all the requirements for a

"proper" theory, but simply described his observations. He was concerned strictly with observable behavior and insisted that terms such as willpower, sensation, drive, instinct or attitude should be of no interest to science, insisting that psychology is a science of overt behavior only. Skinner, then, sees the human being as a neutral, passive creature which learns solely by reacting to the environment.

Operant Conditioning:
In contrast to classical conditioning, where the stimulus (e.g., sight of food) precedes the response (e.g., salivation), in operant conditioning the organism first behaves and then some external event may strengthen or reinforce that behavior. Skinner referred to these initial bits of behavior as operants. He was not interested in the cause of these operants, but solely in the question of which environmental conditions will weaken or strengthen a given operant. The strengthening of operants happens through conditioning which is based on reinforcement.

Like earlier behaviorists, Skinner provided a specific "language" for discussing certain events in the learning process. The present review of Skinner's "theory" will be restricted to the definition of these terms, since it is believed that this will provide the reader with enough background information to appreciate the instructional strategies, which are based on this theory.

Reinforcers:
Any stimulus which increases the probability of a response is called a reinforcer. Reinforcement can be of three kinds: primary, secondary and generalized.

Primary reinforcers are inherent in the organism itself, therefore, no external intervention is required. Primary reinforcers (e.g., food, water, sex) satisfy basic physiological needs. Once these needs are satisfied primary reinforcers are not functional as reinforcers.

Secondary reinforcers are not inherently reinforcing but become so by being paired with a primary reinforcer.

Generalized reinforcers are often culturally determined and may be, for example, external symbols of such attributes as power, status, wealth, fame, prestige, etc.

Reinforcement can be positive or negative.

A positive reinforcer is a stimulus which, by following an operant response, strengthens the probability of that response reoccurring (e.g., praise after good work).

A negative reinforcer, on the other hand, is a stimulus which strengthens an operant response when it is removed. In other words, an unpleasant stimulus (e.g., bright light, loud noise) is removed each time the desired operant behavior occurs. Negative reinforcers are also called averse stimuli. In the case of the negative reinforcer, the organism learns in order to escape the averse stimulus. Negative reinforcement is primarily of experimental interest. It should not be confused with punishment, which is not a negative reinforcer, since punishment is used to suppress inappropriate behavior but not to teach new behaviors.

Schedules of Reinforcement:
Essential for the effectiveness of the learning process is the timing with which reinforcement is provided.

Two major choices exist here:

- continual reinforcement, where a behavior is reinforced every time it occurs, and

- intermittent reinforcement, where reinforcement is provided only part of the time.

Intermittent reinforcement, in turn, can follow either of two schedules. These are reinforcement schedules based on:

- a ratio of reinforcements to trials, or

- an interval of time passed between reinforcements.

Reinforcement further can be offered in fixed or random fashion.

Although in experimental settings, these schedules of reinforcement are used in a much more precise manner than they ever can be used in the classroom, the effectiveness of different scheduling methods appears

to hold true also in classroom settings. Effectiveness has been studied with regard to the acquisition of knowledge, the rate of extinction (the degree of permanence of a behavior after withdrawal of reinforcement), and the rate of responding.

Initial knowledge acquisition seems to occur most quickly when continual reinforcement is used, but this type of reinforcement schedule also leads to rather quick extinction of the behavior. Intermittent reinforcement, on the other hand, results in slower initial knowledge acquisition but also in slower extinction. With regard to the rate of responding, variable schedules, namely those where timing of rewards can not be predicted, produce the highest rate of response.

Shaping:
To this point, we have discussed operant conditioning, where the operant behavior had been available from the onset and then could be strengthened through reinforcement. Shaping, in contrast, is used when the desired behavior does not occur spontaneously. This procedure is also called the method of successive approximations. Here behaviors which resemble more and more the desired "end behavior" are reinforced successively. Many complex human behaviors are successfully learned by this method.

Some Criticisms Which have been Leveled Against Skinner's Model:
- Skinner's description of learning does not consider development. It is assumed that if a particular process is observed at one age, it is valid across ages.

- The child, and man in general, is seen as nothing more than a "cluster of interrelated responses," entirely shaped by its environment. Any explanation of cognitive development which originates from within the individual is rejected.

- Since behavior is explained in a reductionist framework, which asserts that complex behaviors are nothing more than the sum of very simple behaviors, no allowance is made for the separate study of higher mental processes.

- Since only observable behavior is considered, a mechanistic view of cognitive growth is taken, which ignores factors like motivation, affect, or individual differences.

Some Major Contributions of the Model:

- One of Skinner's most important contributions to the understanding of human behavior was his study and description of the effects of reinforcement, which, in turn, provided insights of great practical value to the field of education.

- The much criticized reductionism also led to valuable insights which are particularly useful in the educational context. This reductionism led, for example, to the development of methods of teaching complex behaviors by dividing them into their simplest components.

- Skinner's work has been of great influence to many other theorists and has provided the theoretical underpinnings for tangible, "real life" applications such as programmed instruction.

2.1.2 Gagne's Behavioristic-Eclectic Theory

Robert M. Gagne has drawn from many learning theories in his description of the conditions of learning. His work is often used to serve as underpinning for instructional technology related to behavior modification as well as performance and competency-based education. Although his work is mainly grounded in the behavioristic tradition, he has borrowed ideas from cognitive-field theories and explains the learning process in an information-processing conceptual framework.

In contrast to Skinner, Gagne recognizes that not only stimulus-response and conditioning factors contribute to the learning process. For example, he recognizes that both, teachers' and students' motivations, attitudes, and values influence learning. He, therefore, acknowledges explicitly the contribution of internal conditions as being essential for learning. Perhaps his most significant contribution though, is his recognition of the importance of the student's current state of knowledge for any subsequent learning. He developed a hierarchical taxonomy of learning tasks describing eight levels of tasks of increasing complexity, with each level being seen as prerequisite for the next higher level.

The Taxonomy of Learning Tasks:
If we assume that certain kinds of learning are prerequisite for others, it becomes imperative for effective instruction to establish the hierarchical order of such tasks. According to Gagne, then, the tasks or skills of learning can be described, from simple to complex, as follows:

1) Signal learning refers to the classical conditioning response, where the organism makes a generalized response to a given stimulus (e.g., Pavlov's dog salivating at the sound of the buzzer, students feeling anxious at the sight of examination booklets).

2) Stimulus-response learning refers to making a specific response to a specific stimulus (e.g., the child says "mama" at the sight of the mother).

3) Chaining is the combining of several, previously learned, stimulus-response connections.

4) Verbal association learning follows the same pattern as chaining but applies to cases where, both, stimulus and response are words (e.g., learning the English equivalent for a foreign word).

5) Discrimination learning refers to the process whereby one learns to differentiate among a set of stimuli (e.g., at the sight of various flowers calling one a rose, the next a tulip, etc.).

6) Concept learning is, in a sense, the opposite of discrimination learning. Here we are dealing with the ability to generalize to a unifying concept from a list of specifics (e.g., roses, tulips, etc. are all flowers).

7) Rule learning is demonstrated when the individual can relate a class of stimulus situations to a class of related performances. Rules, in this case, are applied as general principles. These rules, in turn, are composed of concepts.

8) Problem solving, according to Gagne, is an extension of rule learning in that the learner discovers that previously learned rules can be applied to solve problems.

These learning tasks are seen as being, both, heirarchical and cummulative in nature. The scope of this paper allowed only for brief definitions of these learning tasks, Gagne (1970), though, discusses both the unique internal conditions of the learner, and the external conditions of the learning environment which are required for each task.

The Eight Phases of Learning:
Regardless of the learning task, each act of learning is characterized by a series of typical phases. The phases of learning, then, are as follows:

The act of learning is initiated by motivation. If motivation is not present internally, it must be promoted by the environment. Next, before knowledge can be acquired, a phase of apprehending must take place. Here the stimulus is actually perceived. Once the stimulus is apprehended, the learner moves to the all important acquisition phase where knowledge is coded and entered into either short term or long term storage which leads to the next phase of retention or memory. In order for any information to be useful,

recall or retrieval has to be possible. Not only simple recall is important, though, but also the ability to generalize the information to related but different situations. This generalization is also called transfer of learning. Transfer may be lateral, in which case the information is applied at roughly the original level of complexity, or transfer may be vertical, here previously learned capabilities impact on the integration of higher levels of learning. Ultimately, learning should lead to the actual performance of observable behaviors. Finally, feedback occurs through the reinforcement process.

The Five Learning Outcomes:
For Gagne, learning outcomes can be classified into five distinct categories:

1) Verbal information involves merely the stating of the information in question.

2) Intellectual skills involve the student knowing how to perform an act as opposed to simply knowing that certain conditions exist.

3) Cognitive strategies refer to special intellectual skills which pertain to the behavior of the learner while he/she is engaged in the act of learning.

4) Attitudes are defined as acquired internal states which influence the actions of the individual toward things, persons, or events.

5) Motor skills, finally, are involved when activities such as walking, dancing, driving a car, etc. are carried out.

The Role of the Teacher:
The teacher, for Gagne, is the engineer of the learning environment. After desired learning outcomes have been established, and the internal learning conditions of the student have been considered, the teacher's role is to provide the appropriate external learning conditions. Gagne saw the process involved in providing these external learning conditions as following a logical series of steps. These steps are seen as applying across learning tasks and subject areas. The order of these steps is as follows:

- informing the learner of the objectives
- presenting the stimuli

- increasing the attention of the learner
- helping the learner recall what was previously learned
- providing conditions that will evoke performance
- determining the sequence of learning
- promoting and guiding the learning

In review, Gagne synthesized aspects of many theoretical positions into a series of classification systems with regard to important aspects of the learning process. These aspects include: the internal and external conditions affecting the learner, outcomes of the learning process, and functions of teachers. This chapter could only provide a glimpse at the extensive and very practice-oriented work of Gagne which has proven of enormous value for, both, the understanding of cognitive processes and for instructional design.

2.1.3 Bandura's Social Learning Theory

Bandura's (1969) theory of social learning blends behavioristic reinforcement theory and cognitive psychology. It deals mainly with learning processes which lead to socialization. For Bandura, people are, neither exclusively motivated by proactive processes, as some humanists see it, nor are they helplessly at the mercy of the environment, as orthodox behaviorists view them, instead, people are perceived as being engaged in a continuous reciprocal interaction with their environment. Bandura sees people not as products of their environment, but regards them as information-processing creatures who base their behavior on insightful expectations. Behavioral change, therefore, in social learning theory, is facilitated by the awareness of its probable consequences. In Bandura's view people as much influence and shape their environment as the environment influences and changes them.

According to Bandura's theory, the socialization process is primarily achieved through observational learning. Observational learning involves the learner observing a model, interpreting the behavior of the model, and finally imitating the observed behavior.

In the context of the general principle of observational learning, Bandura introduced several new concepts into the behavioristic framework of learning. Some of these concepts, which distinguish Bandura's theory as a rather positive, proactively oriented one among the behavioristic theories, will now be briefly discussed.

Observational Learning:
Simply put, observational learning occurs whenever a person is watching the behavior of a model, forms an opinion about the consequences of this behavior, and then uses this opinion to guide his/her own future behavior. Observational learning has been used across time and cultures ever since humans have lived together in groups. Currently, in our western culture with its emphasis on originality, the concept of learning by imitating others, has at times been viewed with some ambivalence. In the past, though, our culture has based the education of their youth mainly on observational learning. Some subcultures, within North American society,

made particularly strong use of observational learning and still feel more at ease with the concept. For example, young Canadian Ojibway boys would accompany their fathers to learn the intricacies of trapping and hunting, similarly, young girls would spend their days around their mothers learning to prepare game, make clothing, etc. Despite the fact that in highly technological, fast-changing cultures such learning is not as obvious, observational learning, even here, is the main mode of socialization.

Modeling:
In observational learning, then, several variables are essential. First, there is the model. Models can either be real persons or they can be symbolic models (e.g., books, television programs, or even animals). But just observing a model's behavior does not, by itself, constitute learning. For learning to take place, the behavior has to be interpreted with regard to its possible positive or negative consequences.

Outcomes of Modeling:
Modeling can result in three types of outcomes:

- It can facilitate the acquisition of novel behavior. In this case modeled behavior is observed, the positive consequences of the behavior are imitated, and expectancies on the part of the learner are formed with regard to consequences in the event that he/she would engage in similar behavior.

- Modeling can further inhibit or disinhibit existing behavior. In this case negative or positive consequences of deviant behavior might be observed and interpreted in a model and in turn either inhibit or disinhibit similar behavior.

- Finally, modeling can elicit behaviors that are related, but not identical, to the modeled behavior. In this case the positive consequences of one modeled behavior may lead to another behavior in the learner (e.g., one student tries to excel in one area because someone else excels in another area).

Vicarious Reinforcement:
In all three types of observational learning which were described above, reinforcement was not provided in the Skinnerian sense, directly to the learner.

Instead reinforcement was experienced vicariously by observing both the actions of others and the resulting consequences. If the observer perceived that the consequences would also apply to his/her own future behavior, observational learning took place through the mechanism of vicarious reinforcement.

Thus, although observational learning is based on reinforcement principles, it is not a mechanistic process of more or less automatic stimulus-response connections, but mainly a cognitive process, in which the learner's behaviors are contingent on his/her interpretation of the environment.

In addition to the concept of observational learning and various insights related to this concept, Bandura introduced the idea of self-regulation of behavior into the behavioristic framework of learning.

Self-regulation of Behavior:
Social learning theory recognizes that individuals are capable and, in fact, do regulate their own behavior. Three essential steps are involved in this self-regulatory process:

- Individuals have to observe their own actions.
- Then, they have to judge their performance against some internalized standard.
- Finally, based on this judgement, they may provide reinforcement or punishment for themselves.

The first step, self-observation, has to involve formal or informal record keeping of our own actions. In the second step we judge the appropriateness of our own actions against standards which we have developed through observing the behavior of models. This fact has important implications for education since it implies that, both, unrealistically low and unrealistically high individual performance standards, are based on models in the environment (e.g., teachers, parents, peers). The third step in the self-regulation process is one of self-reinforcement. A large body of evidence shows that individuals who regularly reward themselves for appropriate behavior, perform significantly higher than, both, those individuals who do not reward themselves, and those who perform the same

task under instruction from someone else and are externally reinforced. The concept of self-regulation of behavior and the related issue of self-reinforcement are important since they allow for independent learning (without third party reinforcement). The ability to self-regulate one's behavior, is also prerequisite for learning in a life-span context.

Summary:
Bandura's social learning theory, then, states that much of human learning is facilitated through exposure to models. In order for learning to take place, the observations the learner makes of the model's behavior, have to be cognitively processed. Reinforcement can be provided direct, experienced vicariously, or may be self-generated. In addition, cognitive processing of our own behavior allows us to effectively self-regulate it.

Bandura, therefore, views the process of social learning as one of continuous, reciprocal interaction with the environment.

Educational Implications:
- In the light of Bandura's emphasis on observational learning, a major function of the teacher is to model behavior.

- Since reinforcement in Bandura's theory is largely based on how observations are cognitively processed by the learner, a general emphasis on internal awareness is suggested by the theory.

- The principle of reciprocal consequences of behavior implies that both students and teachers function as personal, behavioral, and environmental determinants for each other, in other words, both influence each other's behavior.

2.2 COGNITIVE GESTALT-FIELD THEORIES

The Gestalt-Field view of learning is diametrically opposed to the behavioristic viewpoint in that the basic assumption of Gestalt theories is that the whole does not equal the sum of its parts. Learning is seen as depending crucially on perception, and as involving the reorganization of the perceptual field. Genuine learning, from a Gestaltist point of view, involves insight not rote memorization or stimulus-response connections. Finally, insightful learning is seen as being inherently satisfying and therefore not contingent on external reinforcement.

2.2.1 Classical Gestalt Theory

Gestalt theory is one of several schools of psychological thought that arose during the first decades of the 20th century. Gestaltists saw the structure and organization of the perceptual field rather than simple stimulus-response mechanisms as being the main shapers of thought processes and behavior.

Classical Gestalt theory centres around two basic concepts, namely the concepts of Gestalt and Insight. All other key concepts in this family of theories are conceptually related to either of these two basic concepts.

Gestalt:
"Gestalt" is a German word which is generally translated as "whole" or "configuration." Implied in the term Gestalt is a whole, though, which is conceptualized as a system within which all parts are in dynamic interrelation. A Gestalt, then, is an integrated totality where each part is in the role or function required for it by the nature of the whole. The term is not restricted to visual units, but applies equally to configurations of movement (e.g., body language, dance sequence), sound (e.g., melody), or units of thought (e.g., an intricate sentence, a paragraph, a speech or a proof of a mathematical problem).

Any Gestalt is determined by a number of typical principles and characteristics:

- Dynamic self-distribution determines where and in which function each part of the whole occurs.

- Relational determination regulates the nature of each part and its function in the whole.

- The structure of the whole is derived, in part, from these two principles. No part of a structure can be changed without creating a fundamentally different Gestalt (e.g., card house).

- The organization of any Gestalt is closely connected to its structure since structure is determined by its specific and unique organization.

Laws of Organization:
Gestaltists hold that having insight into a Gestalt means understanding its structure and organization and that the principles of Gestalt organization are fundamental to, both, learning and perception. In 1923 Max Wertheimer formulated his famous "Laws of Organization" which addressed the questions of:

- How are the various portions of the environment segregated into separate units and wholes?

- What makes various parts of the phenomenological field hang together?

The five Laws of Organization are:

The Law of Pragnanz is the most general of these laws and refers to the fact that the whole will be perceived as a unit, if it is at an equilibrium and therefore resists transformation.

The Law of Similarity refers to the tendency of the observer to perceive similar items as forming a group.

The Law of Proximity states that items which are close together will be perceived as forming a unit.

The Law of Closure means that items which together will form an integrated pattern, will be seen as belonging together.

The Law of Common Fate states that objects which experience the same change are seen as a unit and thereby are differentiated from elements in the field which do not share the same fate.

These laws, then, attempt to explain how we segregate the multitude of sensory imput into meaningful units. They explain why certain parts of our environmental field "hang together" while others do not.

Insight:
Gestaltists hold that genuine learning requires the learner to have gained insightful understanding of the matter at hand. Insight involves an understanding of the inherent structure of the problem situation and results in the finding of a solution to the problem. From a Gestaltist point of view, therefore, learning has typically not occurred if a solution to a problem has simply been found by "blindly" following a set of rules.

Wolfgang Köhler (1925) studied insightful learning in his famous experiments with apes. He found that when primates try to solve problems their behavior often shows that they are aware of important relations among aspects of the problem situation, and that in their solution they make use of these "insights." A sequence of behavioral criteria for insight were crystalized from Köhler's experiments:

1) examination of the problem situation

2) hesitation, pause, an attitude of concentrated attention

3) a trial of a more or less adequate mode of response

4) if this trial proves inadequate, a trial of some other mode follows

5) appearance of a critical point - the organism suddenly, directly and definitely performs the required adaptive act

6) ready repetition and transfer of adaptive act

7) overall ability to discover and attend to the essential aspects of the problem situation

8) disinterest to the non-essential aspects of the problem situation

The moment of insight is seen as being accompanied by a sudden, joyful feeling of enlightenment which provides the intrinsic reward to genuine learning. Extrinsic reinforcement, therefore, is viewed as unnecessary or even counterproductive.

During the process of insightful learning, typically, a situation changes from a state where things make no

sense because they seem to be arranged in an arbitrary fashion, to a situation where there is order, logic and meaning.

True understanding has been achieved when an insight that was gained in one situation can be transferred to another situation. Gestalt theory holds that learning which has been achieved merely by mechanistic processes, without insight, is rarely transferrable, whereas insightful learning is readily transferrable to new situations.

Summary:
Classical Gestalt theory views the learning process in a frame of reference which is drastically different from that of Behavior theory. The central beliefs fo Gestaltists are: that the whole is greater than the sum of its parts, and that insight is a crucial factor in problem solving. From the first belief follows the view that the analysis of a subject into its parts will not advance the knowledge about the subject. The second belief leads to the rejection of the trial and error approach to problem solving.

Gestalt theory may be viewed as a conceptual root for cognitivism in that it focused its attention on: understanding, decision making, information processing, and problem solving. Although classical Gestalt theory has not been directly translated into a theory of instruction, its general principles have greatly influenced later theories of learning and instruction.

Implications for Education:
Michael Wertheimer (1980) formulated some propositions for learning which can be derived from classical Gestalt theory and may be summarized as follows:

- Learning depends on perception. Since learning is the process of the discovery of the environment, how we perceive what is crucial about a particular situation is of prime importance.

- Learning involves reorganization. Since learners are not generally able to instantly and correctly understand every situation, a need for a conceptual reorganization of most problem situations exists. Instruction has to aid this reorganization by aiding the student in recognizing the structure and essential components of a problem.

- Learning does justice to what is learned. Gestalt theory implies that material should be presented in such a way that its inherent laws are made transparent.

- Learning is about what leads to what. Since much of learning is concerned with consequences, instruction should be aimed at having the student discover the laws of cause and effect in the "real world."

- Insight avoids "stupid" errors. The Gestalt focus on insight suggests that instruction should be emphasizing understanding rather than rote memorization.

- Gestalt theory further suggests that insightful learning a) is transferrable to new situations, b) does not extinguish, and c) is its own reward and therefore needs no external reinforcement.

2.2.2 Lewin's Cognitive Field Theory

Kurt Lewin was one of the men who worked with Max Wertheimer and was strongly influenced by Gestaltist thought. His own theory, although it is based on Gestalt principles, represents a clear departure from classical Gestalt theory in that it emphasizes personality, motivation, and social interaction rather than perception. His theory not only provided important foundations for later learning theorists, but also strongly influenced the field of social psychology.

Lewin's theory is complex and multifaceted. Even a very brief discussion of all important aspects of this theory far exceeds the scope and mandate of this paper. Since it is believed that his construct of "Life Space" is the most relevant aspect to learning and instruction this chapter will briefly describe what Lewin means by life space and some of the concepts which are related to it.

Life Space:
Life space is a central construct in Lewin's theory. The term refers to the individual's world as he/she perceives it to exist at any given moment. It is a composite of all that is of immediate relevance for a person's behavior. It includes: motives, goals, means and perceived obstacles to those goals, the physical environment, and the person him/herself. Lewin represented life spaces in topographical diagrams containing at the centre of the space the person surrounded by his psychological environment.

The "person" is seen as being composed of a core or inner-personal stratum, which represents the needs of the person, and a surrounding perceptual-motor stratum, which represents abilities.

The "psychological environment," as Lewin sees it, is quite different from the environment as behaviorists see it. Whereas, for behaviorists the physical and psychological environments are identical, for Lewin the psychological environment is what a person makes of his/her physical environment. In other words, it is the kind of meaning or interpretation a person attaches to the physical realities around him/herself.

The psychological environment is surrounded by the outer layer of the life space which Lewin called the foreign hull representing the more remote physical

environment. Whereas, the psychological environment includes everything which is perceived by the person and which affects his/her behavior, the foreign hull contains those aspects which are observable by outsiders, but which, at the moment, have no significance for the behavior of the person.

Several concepts, which are related to dynamics of change within the life space are essential for understanding behavior and development in the Lewinian framework. These will be briefly discussed now:

Region:
A region is an element or fact within a person's life space. Two regions may be closely connected or they may be distant from each other. If they are adjacent to each other, their relationship is determined by the nature of the boundary between them.

Boundary:
Boundaries separate the foreign hull from the psychological environment and it from the core of the person. They further separate various regions within each of these areas. These boundaries are postulated by Lewin as representing more or less permeable divisions between regions of the life space with some being stronger than others. The degree of strength of a boundary is not permanent but may change situationally or developmentally.

Boundaries may serve as "protectors" of aspects of the self or, if they are very strong may represent barriers to the achievement of a particular goal. If boundaries between regions are weak, on the other hand, those regions will easily influence each other. In Lewin's topographical maps of life spaces boundaries are represented as lines of varying thickness according to the degree of their permeability.

Valance:
The term valance, in Lewin's theory, refers to the attractiveness of specific areas in a life space. In Lewin's "topographical" maps positive valances are indicated by single or multiple plus signs, negative valance by minus signs.

Vector:
Lewin borrowed the concept of vectors from physics. In his framework vectors are used to express the direction toward which a behavior is aimed and the

strength which is exerted by it. In his "maps" they are represented as arrows of varying length.

Conflicts:
Lewin used the concepts of valance and vectors to discuss different patterns of behavior conflicts:

First, the approach-approach conflict occurs when a person is drawn, simultaneously, to two incompatible goals (e.g., an offer of two equally attractive jobs).

Second, an approach-avoidance conflict is present when the same event generates feelings which simultaneously pull a person away and toward it (e.g., the desire for cheese cake conflicts with the desire to stay slim).

Third, an avoidance-avoidance conflict exists when the only choice seems to involve two equally distasteful options (e.g., keep suffering from a toothache or go the the dentist - the classical "damned-if-you-do, damned-if-you-don't" situation).

Summary:
A life space can be described in terms of a number of characteristics:

First, it is relativistic because it is defined exclusively in terms of how the environment is perceived by the person whose life space is discussed. For example, if Johnny believes that a ghost lives in his house, the ghost is definitely part of his life space.

Second, any life space constantly changes as a person's circumstances, goals and alternatives change. Therefore, something which was part of the foreign hull may at any time enter the psychological environment and therefore affect a person's behavior; elements of the psychological environment may become irrelevant and become part of the foreign hull, and finally, even the inner core changes through experience.

Third, the life space undergoes developmental metamorphosis with the following typical changes occurring: 1) permeable boundaries between areas of the life space become stronger, 2) the life space increases in size and scope, 3) it becomes more realistic, 4) increasing differentiation between

the layers of the life space occurs, and 5) the increasing variety of content in the life space undergoes integration and organization.

Finally, a life space can be represented as a topographical map of an individual's temporal reality. Topographical, here, implies that these "maps" encompass concepts such as boundary, inside, outside, but do not deal with size, shape, distance or the like. Lewin's maps of life spaces, then, point to relative positions of psychological "facts," their relationships to one another, and the degree of separation between them. Thus, according to Lewin, these representations of life spaces 1) clarify a person's current psychological environment, 2) allow to tailor psychological intervention or instructional approaches to the client's/student's current needs, and 3) allows to anticipate probable behavior.

Educational Implications:

- Learning, as seen by cognitive-field theory, is the process whereby the learner differentiates, generalizes and restructures both his inner core and his psychological environment. This process leads to new insights and understanding.

- Both, teachers and student, in the cognitive-field approach, are considered vital parts of each other's psychological environment, implying that both have impact on each other's behavior.

- The role of the teacher, in this framework, is to promote the development of insights.

- A major goal of instruction is the development of more adequate, open and harmonious personalities. This healthy personality is seen as essential for intelligent functioning.

- Field theorists hold that in order to accomplish this, teachers need to understand the life spaces of their students.

- Teaching strategies which encourage exploration, and reflection and aim at students gaining structural and conceptual understanding of the material are preferred over strategies which encourage simple memorization.

2.2.3 Bruner's "Learning as Categorizing"

Jerome Bruner's theory is not, strictly speaking, a "Gestalt Theory," since it eclectically combines ideas from many theories. Nevertheless, it is philosophically grounded in basic Gestaltist assumptions. It heavily emphasizes the understanding of the inherent structure, both, of the subject at hand and of knowledge itself. Two central unifying themes run through all of Bruner's writing:

- the acquisition of knowledge as an active process,
- the constructing of knowledge through relating new information to previously acquired frames of reference.

Bruner sees the process of learning as a striving to reduce the complexity of the environment with the goal of making it cognitively manageable. According to Bruner this goal is achieved through the process of categorization; therefore, the term category plays a crucial role in his theory.

Categories:
A category may be understood as a collection of rules for classifying things which are in some way equivalent. In Bruner's words: "...to categorize is to render discriminably different things equivalent."

Categories specify four dimensions about objects:

- They define specific characteristics as critical attributes.
- They specify the way in which these attributes are to be combined.
- They assign weights to various properties of the objects in that category.
- They set acceptable limits on these attributes.

Bruner describes two kinds of categories: identity and equivalence categories. The first applies if the category includes only different forms of the same thing. The second applies to categories where different things are addressed as if they were the same thing. These equivalence categories, in turn, may be based on affective, functional or formal criteria.

Categorization, then, allows us to treat different objects or events as if they were the same. The goal of this activity is to enable us to make predictions about probable events related to stimuli and thus to aid the decision-making process.

The Process of Categorization:
Categorization progresses in four sequential steps:

- Primitive categorization involves the isolation and subsequent attendance to a particular stimulus.

- Cue search involves the looking for those attributes that might be useful in identifying the object.

- A confirmation check follows after which the person, if necessary, may look for more cues.

- Finally, the confirmation completion occurs. After this, additional cues are no longer sought out or reacted to.

Before the process of categorization can be initiated a state of perceptual readiness has to exist. Perceptual readiness influences the accessibility of categories. The accessibility of a category, in turn, depends on the individual's needs and expectancies. (Levin, see 2.2.2, would say that it depends on the current life space of the learner). Finally, perceptual readiness also depends on neurological factors.

The more accessible a category is, the less information input is required for categorization. Further, for highly accessible categories, a wider range of input will be accepted, by the same token, it is more likely that other categories, including better ones, will be less available.

Coding Systems:
Since the placing of sensory input into categories does not lead much beyond simple recognition of objects or events, something more is needed. Inferences have to be made on the basis of relationships between categories. Bruner refers to related categories as coding systems. Coding systems are hierarchical arrangements of related categories. In other words, categories are ordered according to their degree of generalness. Therefore, the most general category represents the top of the hierarchy with successively less general categories toward the

bottom of the hierarchy. Bruner holds that the non-specificity of the coding system is an essential factor in retention and transfer of information.

According to Bruner, four conditions affect the acquisition of these generic codes:

- Set, refers to the predisposition of the learner to react in a specific way. Through previous learning or instructional strategy the learner can be made to approach new material as if it were familiar and could therefore be organized in terms of an equally familiar underlying structure.

- Need state, in Bruner's theory, refers to the level of "arousal" which is optimal for learning. Moderate levels of arousal are seen as providing the ideal state for the acquisition of codes and therefore for learning and problem-solving.

- Mastery of specifics is seen as advancing the formation of generic codes. In other words, previous knowledge about a specific event, object, or subject, will greatly facilitate the formation of new codes.

- Diversity of training is closely related to the mastery of specifics. It refers to the idea that if something has been experienced in a wide range of settings, it will be easier to relate the same thing to other events, than if it was only experienced in one setting.

Concept Attainment:
Bruner distinguishes between concept formation and concept attainment. Whereas the former refers to the realization that some objects or events belong together while others don't, the latter refers to the gaining of an understanding of which attributes may be useful for distinguishing members and non-members of a class.

Bruner describes three types of concepts. What type of concept we are dealing with is determined by the relationship between the critical attributes which define that concept.

- Conjunctive concepts are defined by the mere presence of two or more of those critical attributes.

- Disjunctive concepts are defined either by the above criteria or by the existence of only one relevant attribute.

- Relational concepts are defined by the specific relationship between their critical attributes.

Teaching and learning, then, focuses not only on the process of the formation of concepts (which is seen as basically accomplished around age fifteen), but also strives to facilitate the attainment of concepts. Bruner carried out extensive experiments with adults to determine what types of strategies typically are used during concept attainment. He found that each type of concept (conjunctive, disjunctive, and relational) calls for a variety of specific strategies. Although his experimental findings are not directly transferrable to school situations, some aspects of this research are highly significant (see part 2, chapter 7.1) to school settings.

Summary:
The underlying assumption of Bruner's theory is that humans organize the otherwise overwhelming stimulus input in terms of categories which are based on similarities and differences. These categories are essentially classifications in terms of critical attributes which determine the membership or non-memberships of objects and events. Categories, in turn, are organized according to coding systems - hierarchical arrangements of related categories with the higher levels being progressively more general. Learning, according to Bruner, involves the formation and attainment of concepts. Categories, concepts, and coding systems, are seen as facilitating the acquisition and retention of knowledge as well as decision making.

Educational Implications:
Since chapter 5.1 in part II of this paper will discuss instructional strategies based directly on Bruner's theory, only a few points shall be made here:

- Bruner's theoretical work lead him to advocate discovery-oriented techniques of instruction. This position follows logically from the idea that the formation of coding systems is based on the discovery of relationships among various categories.

- Further, process oriented teaching is emphasized

which is aimed at teaching students to think, question, and discover, rather than to memorize.

- Bruner's idea of "perceptual readiness" leads to the importance of considering all factors that ready the student for learning, including: environmental factors, previous learning (both formal and informal), and the student's own needs and expectancies.

- Finally, like other field theorists, Bruner sees learning as intrinsically motivating and therefore does not advocate the use of external reinforcement.

2.3 PIAGET'S COGNITIVE-DESCRIPTIVE THEORY OF INTELLECTUAL DEVELOPMENT

Piaget's theory does not "neatly fit" into any of the broad schools of cognitive psychology but rather is a school onto itself. It is multidisciplinary since it not only borrows from other areas of psychology but also from disciplines other than psychology. Piaget's writings deal with many facets of human conceptual functioning including: moral development, play, drama, perception of reality, and the development of thought. This paper will only deal with the development of thought.

For Piaget the development of thought processes is intimately tied to action. Therefore his method of inquiry centered around the observation of children who were actively involved in the solving of carefully designed experimental problem situations. This observational data was supplemented by interviewing children from infancy to about 15 years of age.

Learning, in the Piagetian sense, results in the increasing ability of the individual to make sense of the environment. As this growth takes place, the child becomes more and more independent of the "distortions" to reality which are caused by the exclusive dependence on sensory input. In Piaget's view, this exclusive dependence on the senses to comprehend the environment, which is typical of young children, hinders logical thought. It is the developmental progression toward logical thought which is the central issue in Piaget's stage theory of cognitive growth.

Since it is assumed that most, if not all, of the readers are familiar with Piaget's work, this chapter will only provide a brief sketch of his theory.

Mechanisms Involved in Cognitive Development:
Piaget's theory states that the development of autonomous thought progresses through four distinct stages. The force behind the movement through these successive stages is a need for a state of equilibrium between perception and understanding. If what is presently perceived can be cognitively processed in a way which satisfies the individual, a state of equilibrium exists. If, on the other hand, the incoming information can not be processed to the satisfaction of the individual, some work is required to restore the equilibrium. This re-establishment of equilibrium may be achieved in two ways: by assimilation or by accommodation. Assimilation is the process

of changing what is perceived so that it will fit currently existing cognitive structures. Accommodation, on the other hand, involves the changing of existing cognitive structures to fit what is perceived.

The Sensorimotor Stage:
This stage extends from birth to approximately age two. Children in this stage display four main characteristics:

- Adaptation to the environment is achieved, as indicated by the name of the stage, directly through overt behavior and the senses.

- The small repertoire of schemata, with which the child was born, is perfected and elaborated, again through overt behavior.

- The notion of object permanence has not been developed: from the child's point of view objects only exist as long as they can be perceived.

- The child's world is perceived exclusively from an egocentric viewpoint.

Toward the end of the sensorimotor stage several developmental tasks generally have been achieved which mark the readiness for the transition to the next stage. These include:

- Beginning language skills and initiative actions signal the onset of "representation."

- Object permanence will have developed. The child now realizes that an object still exists even when he/she can no longer see or feel it.

Preoperational Period:
This period extends to about the age of seven or eight and therefore is typical of children during their first few years of school. During this period a progressively more accurate understanding of the relationships between actions and their consequences is achieved.

Specific accomplishments of this period are:

- Children begin to recognize "qualitative identity" meaning that they realize that if an object changes its shape it still is the same object.

- Children also achieve "functional dependency" meaning that they begin to understand the connection between a goal and the actions needed to achieve it.

- The egocentric stance becomes, gradually, less compelling making children more flexible and able to assume different points of view.

- Toward the latter part of the period children begin to organize the knowledge of their environment in a more and more systematic manner.

- Around age seven, therefore, the child becomes capable of: forming categories, understanding more complex logical relationships, working with the idea of number, and has acquired the principle of "conservation" (the idea that the amount of something is unaffected by changes in shape or number).

Concrete Operations:
The acquisition of the principle of conservation represents the hallmark of transition to the stage of concrete operations. This stage generally extends from age seven or eight to about age eleven or twelve. At this time thought processes start to become more and more systematic in nature.

These more logical thought patterns, initially, do not penetrate all areas of the child's thinking.

As indicated by the name of the stage, the child at this stage needs prior or current concrete experiences as reference for his problem solving. This should not be interpreted, however, that all school learning, during this stage, has to be facilitated by direct manipulation of tangible objects.

Some key achievements during the period of concrete observations are:

- The child acquires operational thought.

- The ideas of "associativity" and "reversibility" are acquired. The former of these refers to the fact that the sum is independent of the order in which things are added (e.g., 3 + 4= 7 and 4 + 3= 7), while the latter refers, for example, to the idea that we not only can combine "nonautos" with autos to achieve means of transportation, but that we also can subtract nonautos from means of transportation to obtain autos.

Formal Operations:
This stage covers the time from approximately eleven or twelve years to fourteen or fifteen years of age. It is not reached by all adults and many of those who are capable of formal thought will not utilize this type of thinking in many problem situations. During this stage the student learns to reason without concrete references and becomes capable of logical, abstract, and scientific thought.

Typical accomplishments of this period include:

- the ability to think in hypothetic-deductive terms,

- the ability to conduct combinational analyses of possibilities, and

- the ability to utilize propositional thinking.

Summary:
Piaget described the progressive unfolding of children's thought processes in a developmental framework. He isolated typical milestones in the child's understanding and processing of reality and related these to typical age levels. It needs to be kept in mind, though, that the time of transition from stage to stage varies from individual to individual. Further, any transition happens gradually, with children in the early phase of any given stage sometimes using thought processes which are characteristic of the new stage, while at other times using "old" thought patterns.

Piaget's position on the process of learning may be crystalized to the following major points:

- Acquisition of knowledge is a gradual and developmental process.

- It is made possible through the child's interaction with the environment.

- The level of sophistication of the child's representation of reality is determined by his/her stage of development.

- Stages are defined by the nature of the thought structures which are utilized by the child.

- Learning is shaped by a combination of the following forces: maturation, environment, need for equilibrium, and socialization.

Educational Implications:
A wealth of literature exists which provides detailed suggestions for teachers based on Piaget's work. In the context of the mandate of this paper, a few global implications arising from this theory are listed here:

- The major significance for teachers, lies in the sense of direction and sequence Piaget's stage theory provides.

- Piaget's theory implies that curriculum must recognize the child's development and seek to organize learning activities in such a way that they are appropriate for the age level of the child.

- Emphasis during the early years of school should be on experiential learning.

- During later years emphasis may shift to more theoretical and abstract methods of instruction.

- The theory suggests that the emphasis of teaching should be to channel student's activities so that they may extract meaning from the world around them, rather than an emphasis on direct instruction.

- Instruction should not aim at undue developmental acceleration, since in Piaget's framework development is seen as being regulated mainly by internal processes which are not responsive to external acceleration. Educational efforts, therefore, should be aimed at broadening the base of intellectual experiences within each appropriate stage, rather than attempting to hasten progress from stage to stage.

2.4 INFORMATION PROCESSING APPROACH

Even according to its own adherents, the Information-Processing approach does not yet fulfill the criteria of a comprehensive theory of cognitive development, rather it represents a general approach to the study of cognition. Within this approach a large number of researchers have dealt with a multitude of aspects of cognition. The scope of this paper only allows inclusion of some of the key issues which emerged, ignoring many others.

Key Concepts:
Some of the key elements which characterize the Information-Processing approach are:

* a perception of human cognition in terms of information-processing devices
* a view of development as self-modification
* an emphasis on detailed task analysis
* a view of cognition which puts little emphasis on development

Since these key elements all have potential educational implications, each will be briefly discussed now.

The Computer Metaphor:
At the heart of the Information-Processing approach is the idea that human cognitive functioning may be understood in terms of an electronic information-processing device, the computer. The assumption therefore is made that human cognition is made up of individual processes which operate sequentially. These processes include: encoding, storing, symbolic representation, and transformation. The system (cognitive functioning) may be restricted by two entities: processing capacity and fixed storage capacity. The final product of the cognitive process (e.g., solution to a problem) is seen as output.

Development as Self-modification:
Recent breakthroughs in computer technology allowed for development of self-correcting, self-modifying programs. Several Information-Processing psychologists suggest that cognitive development, similarly, takes place through self-correcting as a result of feedback processed by the system. In more concrete terms, the child tries out a variety of rules and

strategies which are rejected or retained according to their usefulness, thus a child becomes a progressively more efficient information processor.

Task Analysis:
Another key characteristic of the Information-Processing approach is its detailed analysis of cognitive tasks. Various tasks make different and unique demands on processing activities. Such processing activities, for example, are verbal rehearsal, categorization, and elaboration, to name just a few. In contrast to earlier learning theories which also dealt with the breakdown of complex behaviors into simple tasks, these new task analyses delved much deeper, and in much greater detail, into the complex sequences of mental operations following stimulus input. Although these practices have been criticized by many as reductionism they have contributed a great deal to our knowledge of the learning process (see section on learning strategies in Part II).

Developmental Issues:
Although the Information-Processing approach started with a focus on adult cognition and largely ignored developmental concerns, within this approach exist three broad areas of research which have attempted to investigate developmental questons. These are the areas of memory, representation, and problem solving.

Memory:
Shiffrin and Atkinson proposed in 1969 a flowchart conceptualization of the memory system. The conceptual framework and terminology of this schema of memory is still in use and is essential to the understanding of, both, present research trends and students cognitive functioning in the classroom. According to this schema, stimulus imput is first received by the sensory register where it is held for an extremely short period of time (a fraction of a second). From there it continues to the short-term store (15-30 seconds or longer if special strategies are used). If the information is not either attended to in short-term store, or channelled to long-term store, it is quickly lost. In contrast to short-term store, which has a small capacity, long-term store has a large capacity and can retain information indefinitely. Therefore, short-term store is the major limiting factor in memory, acting like a bottleneck in the memory system. Various strategies have been shown to greatly reduce this limitation including: rehearsal, leaving clues, forming categories, etc.

A large number of studies have supported the notion that both the type of strategy used and the degree of efficiency of use, are determined by a refinement process from simple to complex processing which progresses in a predictable developmental order.

For example, Flavell showed in 1969 that few 5- year olds, more than 50% of 7- year olds, and most of the 10- year olds, spontaneously used rehearsal techniques. In general, as children use strategies they progressively refine them. For example third-graders rehearse just one word at a time, whereas eighth-graders generally rehearse cumulative (repeat all previously learned words in a series plus the new one).

Research suggests that by the preteen years most children use a variety of strategies and are able to select a suitable strategy for the task at hand. They also seem to be able, at this age, to ignore irrelevant and process only relevant information, thus reducing the pressure on short-term memory capacity.

Research evidence further clearly indicates that these strategies can be taught thus increasing the processing capacity greatly. This is of great importance since memory limitations are known to restrict the use of available reasoning skills and also are closely tied to the acquisition of knowledge.

Representation:
Representation refers to the mental forms in which information is cast. Knowledge may be represented in words, actions, images, abstract propositions, etc. These representations therefore may be classed as semantic, episodic, visual, iconic. Research seems to point to some developmental tendency for younger children to prefer visual representations and other nonverbal forms over verbal ones.

Problem-Solving:
Several researchers have investigated the rules children use when solving Piagetian problems. When these rules are translated into "computer language" we encounter two important concepts: Productions - which are condition-action rules, and production systems - which are sets of productions stored in long-term memory. The formal study and representation of production systems has contributed to the knowledge of learning processes by producing explicit, detailed, moment-by-moment descriptions of how the child solves a problem.

Several theorists have attempted to put these insights into developmental perspective. Perhaps the most promising of such attempts to date has been made by Robbie Case. His developmental theory of intellectual development is discussed in some detail in the next chapter since it is believed to hold much promise for educators and especially curriculum developers.

The following points summarize some of the more important factors of the Information-Processing Approach which are of interest to the educational process.

Shortcomings:
The approach limits itself to proposing models of performance on specific tasks while neglecting to integrate these models into a broader perspective of human cognitive functioning.

It does not put adequate emphasis on metacognitive processes since it deals predominantly with strategy execution rather than with the selection of strategies or executive strategies.

Finally, it largely ignores development.

Major Strength:
It provides detailed research and descriptions of steps of cognitive processing.

It further provides detailed mapping of conceptual networks.

It explores cognitive strategies.

It provides a "mapping" of memory processes.

In general it has a strong process orientation.

The many strengths of this approach and the obvious shortcomings, in particular with regard to education, have lead to the theory of R. Case. His theory of Intellectual Development combines the strength of the information processing approach, with older notions on cognitive development, especially Piaget's, in a comprehensive account of intellectual development (see next chapter).

2.5 TOWARD A CONSOLIDATION OF THEORIES (R. CASE)

The theory of intellectual development from birth to adulthood by Robbie Case (1985) combines the strength as well as attempts to rectify some of the shortcomings of several earlier theories. Case's comprehensive framework of intellectual growth incorporates major elements of Piaget's and Bruner's theories while using information processing concepts and metaphors to describe the process by which problems are solved at various stages. This theory appears to hold much promise as a framework for research and as a conceptual base for the description and explanation of cognitive development and functioning. It further may serve, both, as a prescriptive guide for curriculum design, and as a theoretical base for instructional strategies.

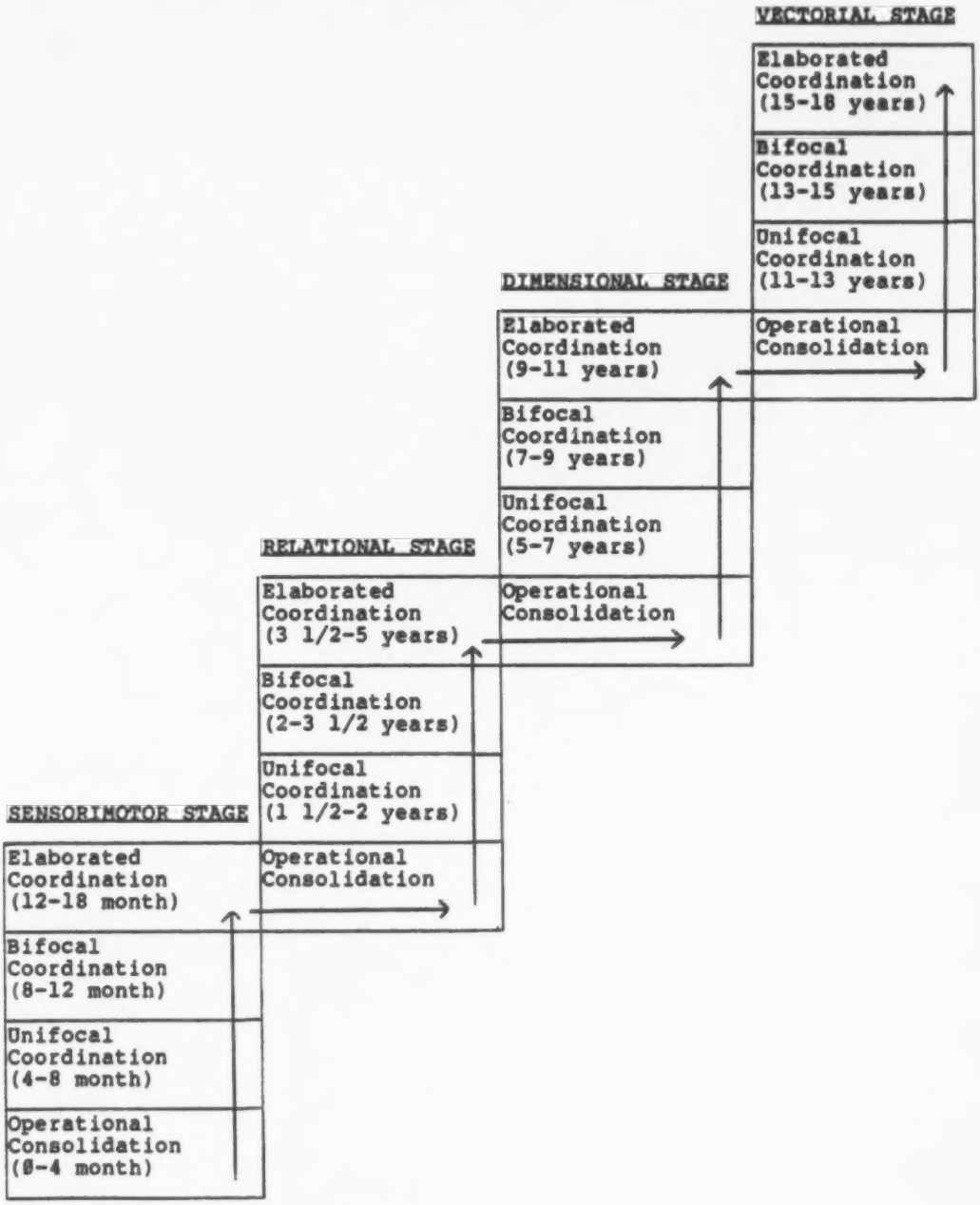
It is beyond the scope of this paper to give an exhaustive account of this multi-faceted theory or even to mention all aspects of it, therefore, the interested reader is referred to Case's (1985) book for a more complete insight into this theory. The present chapter, merely, provides a brief overview of the theory and draws the reader's attention to some of the elements which differentiate it from the three theoretical frameworks from which it drew, as well as to those elements which it shares with these theories.

Overview:
Table VI shows a schematic representation of the four stages of Case's theory of intellectual development and their substages.

The first stage, the Sensorimotor Stage, spans approximately the time from birth to 18 months. The second, the Relational Stage, extends from approximately one to five years of age. The Dimensional Stage, which follows, spans the time from three and a half to eleven years, and the final stage, the Vectorial Stage, is traversed from approximately age 9 to age 18.

Within each stage, development progresses through three substages: Unifocal-, Bifocal-, and Elaborated Coordination. Prior to the Unifocal substage, a period of Operational Consolidation exists where previously acquired cognitive structures are consolidated. This period and the last substage of the previous stage occupy the same time span which accounts for the overlap in age levels for each of the four stages.

Table VI: Case's Theory of Intellectual Development



Adapted from: R. Case, (1985)

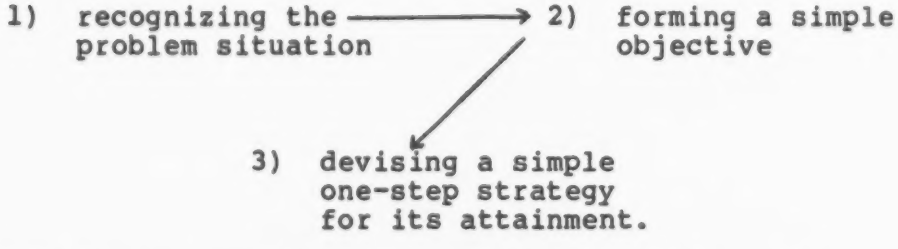
Case views the child as a problem solver. To be such a "problem solver" an individual has to be capable of formulating objectives and of pursuing them even in the face of obstacles. According to Case, children are endowed with natural desires to set and reach goals and have natural capabilities for overcoming barriers between themselves and those goals.

He sees development as entailing the child to aspire to increasingly higher-order objectives while using progressively more complex strategies to accomplish those objectives. The development of higher-order strategies and goals is seen as based on the refinement of lower order objectives and strategies. For example, the objectives of the very young infant are modest indeed (e.g., not losing sight of an interesting object dangling above the crib, or sustaining a smile game with the mother). Similarly, the solutions to these problems are achieved with comparable simple strategies. It is the pursuit of these simple goals, though, and their attainment with the help of low-order strategies, which lay the foundation for future cognitive functioning.

The Stages of Intellectual Development:

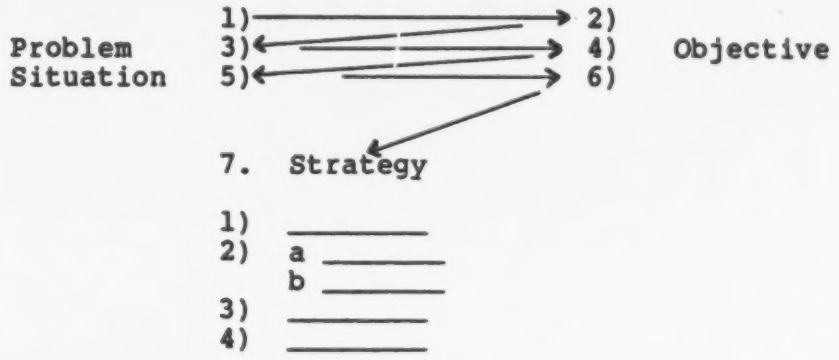
Sensorimotor Stage:
This stage in Case's theory basically corresponds to Piaget's first stage. As the name implies, intellectual development, during this time, centers around sensory objects and motor activity. The difference in Case's theory lies mainly in his rigor of experimental design and the detailed description and charting of mental operations which are typically performed by children at the various stages and substages.

In each stage children initially (Operational Consolidation) follow a simple pattern of problem solving:


1) recognizing the problem situation
2) forming a simple objective
3) devising a simple one-step strategy for its attainment.

During the next three substages these "executive control structures" are refined to increasingly more complex patterns.

Therefore, during the final substage of each stage (Elaborate Coordination) the child would switch several times back and forth between successive aspects of the problem situation to successive steps in the objective, in order to finally develop a multi-step strategy to reach his/her objective.



Relational Stage:
The structural pattern during this period of early childhood is quite similar to the previous one. The essential difference between the two periods is that whereas in the first 1 1/2 years of life the basic units of thought are related to sensory objects and motor activities, during the next four years these units are the relationships between those objects and actions.

Dimensional Stage:
Dimensional thought in Case's theory is roughly equivalent to Piaget's concrete operational thought. The progress through the substages, again, follows a similar pattern as in the first two stages: from simple problem - objective - strategy, to - repeated back and forth movements between problem and objective to a multi-stepped strategy. In this stage the concept of dimension is the key issue. Dimensions such as "weight," "height," and most importantly "number" will now be mastered and incorporated into the problem solving process.

Vectorial Stage:
Case also refers to this stage as the "abstract dimensional stage." During this time, as during Piaget's stage of formal operations, the child and later the adolescent acquires the ability of abstract reasoning. Now, the child will not just be able to deal with a variety of dimensional relationships in his problem solving activities, but will also be able to take the magnitude of various dimensions into account.

Again, progression from simple to complex control structures occurs, but now within the domain of vectorial thought.

For Case, then, intellectual development is characterized by changes in the child's "executive control structures" which determine the child's ability and typical strategies for problem solving.

Executive Control Structures:
This concept is central to Case's theory and therefore needs defining. The term refers to an integral mental blueprint which represents a person's habitual way of constructing a particular problem situation, together with his/her habitual procedure for dealing with it. (Case, 1985, p. 68). Therefore, executive control structures are presumed to contain three essential components:

- a representation of the problem situation,
- a representation of typical objectives, and
- a representation of the typical strategy which is generally used to solve it (a set of metal steps).

Case's theory provides detailed, mapped accounts of these progressively more complex executive control structures for each of the four stages and their substages, not just in general terms, but also as they apply to various content domains.

Mechanisms of Stage Transition:
Several key mechanisms are hypothesized to affect the movement through the stages. These are:

- Transition from one stage to the next involves the hierarchical integration of executive structures which were assembled during the previous stage.

- Movement from substage to substage, also, occurs through the process of integration, but this integration need not be hierarchical.

- New executive structures are formed through problem solving, exploration, imitation, and mutual regulation, all of which involve schematic search, evaluation, retagging, and consolidation.

- Instruction is a crucially important form of mutual regulation.

- Although the capacity for hierarchical integration of structures is limited by the availability of short

term storage capacity (see chapter 2.4 Information Processing), growth is achieved through increase in operational efficiency at each higher stage and substage.

- This increase in efficiency, in turn, depends on neurological factors, maturation, and practice.

Summary:
Case's approach to intellectual development, then, combines the technical rigor of the information processing approach with developmental insights closely akin to Piaget's work. In addition, in accord with Bruner's theory, the culture and human environment of the growing child is seen as contributing vitally to intellectual development.

Following is a summary of key aspects of Case's theory which correspond to the three approaches which most strongly influenced it:

Elements related to Piaget's theory:

- Development is seen as progressing through a universal sequence.

- The rate of development is, at least in part, determined by internal variables.

Elements related to Bruner's theory:

- Essential structures are generated by a given culture.

- Appropriately designed educational environments are essential if students are to realize their full potential.

Elements related to the information processing approach:

- Intellectual operations are conceptualized as executive control structure.

- Information processing terminology such as short term storage space (STSS), processing capacity, executive processing load (EPL), etc., are used to explain mental processes.

- Practice is seen as having a place in any well-balanced curriculum.

Educational Implications:
Many of the above listed elements point directly to the relevance of this theory for education. In addition, Case points to the following implications of his theory for education:

- High level insights and skills need active facilitation in order to develop fully.

- To this end, first adult control structures, which are used to deal with relevant problem situations, need to be analyzed.

- Second, developmental precursors of these high-level control structures must be analyzed.

- Third, educational activities need to be selected with two points in mind: 1) to be appropriate for the current level of the students, and 2) to enable students to progress toward higher levels.

Curriculum therefore should be designed in such a way that it permits teachers to adapt it to individual needs by making decisions concerning the following factors:

- the child's current developmental level,
- the balance of independent and socially regulated activities,
- the degree of task simplification.

2.6 SUMMARY OF COGNITIVE THEORIES

The previous chapters gave a brief overview of key aspects of some important theoretical approaches to the study of cognition. In contrast to the theories of social-emotional growth, the theories of cognitive growth, in general, were less concerned with questions of development. In fact, only Piaget and recently Case, focused their research on the developmental progression of cognitive functioning. The other theories, generally, were more interested in the processes which are involved in learning in general, than they were in considering cognitive functioning as it is influenced by the process of maturation. Therefore, typical cognitive developmental characteristics according to crucial age levels, across all theories, could not be established (as they could be with regard to social-emotional development).

When looking, then, at an overview of the cognitive theories (see Table VII) the reader will notice some rather unreconcilable views of: the learner, the goal of learning, as well as ways of facilitating learning. Whereas it appears that aspects of some theories can complement each other (see Case), other theories are in diametrical opposition to each other philosophically as well as in goal and method (e.g., Behavioristic-Gestalt), and therefore do not seem reconcilable. Each educator, therefore, will have to do some "soul searching" in order to re-evaluate, from time to time, his/her own position. Despite the philosophical and conceptual differences, though, it must be kept in mind, that aspects of all of the approaches to the process of learning have their place in instruction, and that concepts as well as practical implication of the various theories may (and should) be used eclectively according to: student characteristics, teacher characteristics, subject matter, and instructional objective.

Finally, an awareness of the key aspects of various cognitive theories is desirable when choosing and implementing instructional strategies (see Part II of this paper).

Table VII: Summary of Theories of Cognitive Development

Theory	View of Learner	Goal of Learning	Key Concepts	Learning is Facilitated by:
Behavioristic Theories	a passive or reactive organism with innate reflexes and needs	acquisition of appropriate response patterns	-stimulus/ response connection -conditioning -reinforcement	-external stimuli -rewards -punishment -reinforcement -imitation
Cognitive-Gestalt Theories	a purposeful being in mutual interaction with the environment	development of insightful understanding of structure	-insight -perception -life space -concept -Gestalt	-perception according to laws -desire for insight -instruction which aids understanding
Piaget	a young scientist in the making	development of logical, mathematical, scientific thought patterns	-developmental stages -equilibration -assimilation -accommodation	-internal desire for equilibrium -natural development -curriculum geared to current stage of development
Information Processing	a manipulator of symbols and processor of information	becoming an efficient information processor	-computer metaphor -memory -task analysis -problem solving	-increasingly efficient information processing system -practice
R. Case	a young problem-solver	development of high-level problem solving abilities	-developmental stages -executive control structures -problem solving	-natural development -task analysis -carefully designed curriculum -instruction -practice

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PART II INSTRUCTIONAL STRATEGIES

Introduction:
The purpose of this section is to provide the reader with brief descriptions of major instructional strategies. These various strategies are methods of creating favorable environments for learning. The reader will notice that different strategies create distinctly different learning environments. It is believed that the intelligent use of these tools - namely matching the strategies to a) the changing needs of students b) different educational goals, c) teacher characteristics, and d) curriculum content is the key to effective instructional outcomes. Curriculum designers need to be aware of the scope and variety of alternative approaches to instruction so that they may construct the framework that will enable teachers to provide diverse learners with the opportunity to reach a variety of educational goals.

The fact that the various models have distinctly different goals explains that no one model of instruction is sufficient or universally applicable.

Most models can be adapted to a variety of age groups or developmental levels. In other words, the models are not age-specific, rather they focus on different aspects of learning. The "Personal" and "Social" groups, for example, focus on human growth and self understanding, as well as interpersonal skills and social commitment, while the "Information-Processing" group is mainly concerned with concept formation, models of inquiry and other methods which are believed to increase intellectual capacity.

Although strategies are described here as seperate units, many can be successfully combined. For example, the essential principles of the Cooperative Learning approach can be successfully combined with aspects of inquiry techniques.

We, in accord with Joyce and Weil (1980), believe that education should be a "cafeteria of alternatives" to stimulate personal growth and thus enable all students to reach their full potential.

3 PERSONAL AND SOCIAL ORIENTED STRATEGIES

The personal and social oriented strategies share a common concern for personal growth and the quality of human interaction. While some of these strategies make these goals their prime objective (e.g., Classroom Meeting, T-Group, Awareness Training), others are aimed at helping to transmit content through socially or personally oriented strategies (e.g., Group Investigation, Cooperative Learning and Synectics).

As part of the Program Policy Proposals, the Curriculum Review Committee identified six categories of common essential learnings. The personal and social instructional strategies, which are described in the following chapters, are designed to foster growth in three of these six categories: communication skills, personal and social skills and values, and critical and creative thinking.

The social oriented strategies, specifically, deal with two broad concerns: interpersonal relationships and concepts of society. Those strategies which deal mainly with interpersonal relationships offer a variety of techniques which help students to deal more effectively and productively with each other, while those which deal with concepts of society are aimed at the democratic process itself.

The person oriented strategies share a strong emphasis on personal development toward growth and selfhood. They focus on helping students to understand the processes which individuals use to organize their realities. These models all seek to lead the individual to richer inter- and intrapersonal lives. They emphasize a nurturant educational environment, typically advocating much room for flexibility and student initiative. This flexibility is essential, both, for the full self-realization of each individual and for the nurturing of creativity. The development of creativity, in fact, is one declared goal of this group of strategies.

This chapter, therefore, will be opened with a section on SYNECTICS - a strategy aimed at developing creativity.

3.1 SYNECTICS

The synectics model for developing creativity was designed by William Gordon (1961). It is based on four assumptions about the nature of creativity.

1) Creativity is important in everyday activities.

2) The creative process can be described.
3) The process of creative invention is similar in all fields.
4) Creative thinking follows similar paths in groups and individuals.

It is further assumed that once the creative process is brought into awareness we can increase creative capacity. He postulates that emotion and irrationality are more crucial to creative thought than are the intellect and rationality. He maintains that these emotional, irrational processes must be brought to awareness in order to increase problem solving abilities. In other words, once irrational processes are understood they can be used purposefully and constructively to generate novel, innovative approaches.

The vehicle of the Synectics Model is the metaphor. Through its guided use creative problem solving (in the broadest sense) is advanced in two ways: by making the strange familiar or by viewing familiar things in new ways.

Gordon described three kinds of metaphorical forms:

1) Personal Analogy requires the student to empathize with ideas or objects. This empathy should ideally result in the temporary loss of self into some other object. The greater the conceptual distance is between the students identity and the analogical form, the more fruitful is the exercise for the emergence of creative, original thought.

   Four progressively complex levels of involvement in personal analogies are described:

   First-person description of facts
   Well known facts are simply restated in the first person.

   First-person identification
   Here the student recites common emotions which might be connected to the object of the analogy.

   Empathetic identification with a living thing
   The student now identifies on an emotional level with the analogy.

   Empathetic identification with a nonliving object
   The person vividly and empathetically identifies with an inorganic object.

2) Direct Analogy is a comparison of two objects or concepts. It superimposes the conditions of the problem at hand onto another situation thus generating novel ideas for dealing with existing problems.

3) Compressed Conflict is the third metaphorical form. Here two conflicting descriptions of an object or condition are incorporated into a two-word statement (e.g. angry-game, discouraging-fun, etc.).

The purpose of these metaphorical exercises is to stretch the imagination, to visualize concepts and connections between concept, to break out of mental sets, and generally to widen students' perspectives. Synectics have been shown to promote more creative writing, speaking and problem solving. Further, the process of taking on someone or something else's identity potentially increases students empathy and furthers group cohesiveness.

Depending on the desired outcome different sequences of steps are suggested.

Following are brief outlines of two sequences of analogy formation procedures which were adapted from Joyce and Weil (1986, pp 169 and 175).

The first sequence shows the steps teachers should lead their pupils through if the goal is to help students to see familiar things in fresh and innovative ways.

1) The teacher asks the students to describe the current problem situation as they see it.

2) The student then is encouraged to find direct analogies for the situation.

3) After this one analogy is chosen and students personally identify with it, attempting progressively to become the analogy.

4) Looking at their descriptions from step one and two students now are to come up with as many as possible compressed conflicts, finally choosing one of them.

5) Based on this compressed conflict another direct analogy is developed.

6) Finally, teachers and students return to the original problem situation and use the final analogy and/or other steps of the synectics experience to work on the solution to the problem.

In summary, as students progress through the steps of this model, no logical restraints are placed upon them in order to increase the conceptual distance between their own experience and the metaphor of the analogy. This gives free flow to innovative and original ideas. Only in step six is there a return to logical restrictions as the new ideas will be incorporated into a feasible problem solution.

The second sequence is designed to assist in exploring the unfamiliar. Here students are guided in connecting new concepts with familiar ones. The steps of this strategy to making the strange familiar are as follows:

1) The teacher provides information on the new topic.

2) The teacher suggests a direct analogy and students are asked to elaborate aspects of this analogy.

3) Students, then, are asked to become that analogy through empathetic identification.

4) Following this, students are to explain similarities between the new material and the analogy.

5) Students explore aspects of the analogy which do not fit.

6) Students then explore the topic on its own terms.

7) Finally students provide their own direct analogy for the topic.

Synectics as an instructional strategy asks for moderate structure with the teacher initiating sequences but much freedom given to students for open-ended discussion.

There are many appropriate uses of synectics in the curriculum. While the use of synectic techniques is directed at developing creativity in groups as well as individuals, it also creates a community of equals with status gained simply from contributing thoughts.

Applications:
Synectics may be used successfully in most subject areas. Its principles can be applied to discussion, role play, art activities and may be used with students ranging from middle years to high school as well as adults. Although applicable to an almost indefinite variety of uses, it has most successfully been used in the areas of creative writing, problem solving and the creation and designing of products. In general, the strategy is useful whenever a broadening of perspectives is desired.

3.2 AWARENESS TRAINING MODEL

The central assumption underlying this strategy is that an awareness of one's own needs and feelings is essential in order to reach one's full potential. The originator of this model, William Schutz (1958, 1967), has developed strategies which are believed to facilitate this awareness.

The theory underlying awareness training states:

(a) that self-concept is based on relationships with others, and

(b) that in relationships with others, people have three basic needs: inclusion, control, and affection.

Awareness training is designed to help individuals to become aware of their feelings, and of how their behavior relates to the three basic needs. It is believed that through the process of awareness training the individual will not only become aware of his/her own needs and feelings, but through it will be more competent in social interactions, and will asume more self-responsibility.

Key Elements:
Awareness training is characterized by three guidelines: take responsibility for yourself, focus on feelings, and engage in feedback.

Responsibility implies:

- acknowledging that oneself is the source of one's own difficulties
- taking responsibility for doing something about these difficulties
- making one's own decisions
- taking charge of one's own life
- using language which reflects this responsibility (e.g., "I won't" instead of "I can't")

Focusing on feelings implies:

- discussion should concentrate on feelings which accompany the experience

- do not focus on thoughts behind and reasons for experiences - do not rationalize

- use language which reflects personal feelings (e.g., "I feel" instead of "it seems to me")

Feedback implies:

- a willingness to give and receive feedback

- feedback needs to be specific and direct

- feedback should describe behavior not assign "labels"

Awareness training sessions generally consist of two phases: posing and completing a task, and discussing or analyzing it, keeping in mind the three above guidelines. The facilitator provides low to moderate structure mainly by setting the sequence of tasks. The leader further ensures that an atmosphere of openness and honesty prevails at all times during the sessions.

Application:
Awareness training is one of many methods which may be used for the purpose of affective education, therefore, its prime focus is on human emotions. Awareness training may be used, for example, in the classroom for a short period of time each day or at certain days of the week. It can easily be adapted for age levels from K-12.

3.3 CLASSROOM MEETING MODEL AND LABORATORY TRAINING

Both of these models use group processes to facilitate intrapersonal growth and interpersonal interaction skills. Both use group dynamics to increase self-knowledge and self-direction, however their methods and basic assumptions differ. The current chapter will only hint at some of these methods and assumptions. The reader who desires to have more information on these methods is referred to Joyce and Weil (1986) for a comprehensive summary of these techniques, or to writings of some of the originators of these strategies (e.g., Glasser, 1965, 1969; Shepard, 1964).

The Classroom Meeting Model:
This strategy is based on Glasser's "Reality Therapy" which he adapted in this model to the classroom setting.

The belief that most problems, which humans encounter, are the result of inadequate social functioning underlies this model. It is further assumed, that if the following four basic requirements are fulfilled, social functioning will be greatly improved:

- Facing Reality: Individuals have to assess and choose their behavior according to its consequences to themselves and others.

- Assuming Responsibility: Once behavior which is based on reality has been chosen, individuals have to assume the responsibility for carrying it out.

- Commitment to Morality: Individuals have to set standards for themselves as to what is "right" and then be faithful to these standards.

- Intense Personal Involvement: Such involvement, for Glasser, requires both love and discipline.

The classroom meeting model, then, is the vehicle which helps to build these four basic requirements. Students get together for social problem solving sessions. The topics are social problems which have arisen within the classroom. The goal is toward a positive resolving of these problems without fault finding or blaming.

Each such meeting includes six phases:

- establishing a climate of involvement
- exposing the problem for discussion
- making a personal value judgement

- identifying alternate courses of action
- making a commitment
- after a time, assessing the effectiveness of new behaviors

During these meetings, the teacher sets the general course of the action but exhibits a nonjudgemental attitude. The teacher further needs to show warmth and be a skillful facilitator of interpersonal discussion.

Laboratory Training or T-Group Model:
The laboratory method is based on Lewin's concept of life space (see part I) and was developed with his collaboration. The method is specifically designed to improve interpersonal relations and personal flexibility. Through the process participants gain increased awareness of their own and others' feelings, as well as the genuine differences between peoples with regard to goals, needs, and styles of approaching problems. Ideally, groups of about 10 members meet for extended periods (8-40 hours) in a setting which is removed from their normal, everyday life. Therefore, this strategy, in its original form does not lend itself easily for use in the day-to-day school life, but may be adapted to "fit" the school day, or may be used in special situations (e.g., extended field trips, etc.).

Without going into the details of this technique, four key characteristics shall be mentioned here:

- The method is non-directive: The facilitator does not "lead" in the commonly understood sense, nor does he/she provide an agenda or even goal. The resulting stress is intended to facilitate the emergence of "real" issues and ultimately promote self-direction.

- An orientation toward group growth and individual learning and personal development is characteristic of this method.

- A strict focus on the "here and now" makes the experiences and the feedback of the session into, both, the topic of discussion and the material which provides the learning experience, rather than using past experiences as the basis for discussion.

- Both, members and "trainer" take the role of observant participant.

The reader who would like to have a thorough introduction into the laboratory method is referred to: Bradford, Gibb and Benne (1964) or to Golembiewski and Blumberg (1970).

Application:
The models are generally useful whenever the goal is to improve interpersonal relationships and or self understanding.

Classroom meetings may be held as often as several times a day or as rarely as a few times a week. The technique is particularly useful for relatively brief meetings at the start of the day to share experiences, to discuss topics of personal interest, and to plan the day's activities.

The T-group model, on the other hand, is most suitable for special times, away from the day-to-day school setting, when longer time blocks are available.

Both strategies, although adaptable to all age levels, are generally more accepted in the middle to upper levels.

3.4 ROLE PLAYING

The role playing model, which is described here, was developed by Fannie and George Shaftel (1984). It again, aims at improving social skills and increasing self-awareness. But beyond this, it helps students to collect and organize information, especially about social issues, it encourages reflection on personal and social values, and it provides students with tools as well as insights which enable them to deal with problem situations in decent and democratic ways. Simply put, role playing allows the participants to deal with problems through action: through identifying the problem, acting it out, and discussing it.

Basic Assumptions:
The strategy of role playing is based on the central assumption that analogies of "real-life" problem situations can be created and that, with the help of these analogies, experience-based learning can be achieved. Following from this central idea are a variety of further assumptions:

- typical emotional responses may be elicited via role play
- such emotions, both of self and others, may be recognized and analyzed
- analysis and discussion of enacted material is as important as the role play itself
- not only emotional content, but also intellectual content may be explored through role play
- further, attitudes, values, and belief systems of self and others may be recognized with the help of this technique
- connections may be explored between such attitudes, values, and belief systems and behavior, as well as its consequences
- as a result, if necessary, personal attitudes and belief systems may be reassessed or revised

The Concept of Role:
"Role", in Shaftel's sense, does not just refer to a particular "part" one may play, but is mainly understood from the psychological point of view as the unique manner of relating to others which characterizes

each individual. These "roles" are shaped over many years through life experiences, relationships to other people, and cultural and environmental influences. For a clear understanding of ourselves and others, it is crucially important to be aware of roles. It is believed that role playing promotes this understanding by forcing us to emerge ourselves in the roles of others, as well as to examine our own roles.

Method:
The authors of this instructional strategy suggest a series of typical steps which should structure the role playing sessions:

1) Warm up
   The problem is identified and made explicit. Issues are explored, and role playing is explained.

2) Casting
   Roles are analyzed and players are selected.

3) Set Stage
   Decide on line of action and restate roles.

4) Preparation of Observers
   Decide what to look for and assign specific observation tasks.

5) The Play
   Have the "actors" enact the story line (fairly brief).

6) Discussion and Evaluation
   Discuss action and major focus. Develop next enactment.

7) Re-enactment
   Re-enact the "play" taking into consideration the previous discussion and evaluation, (steps 6 and 7 may be repeated several times)

8) Experience Sharing and Generalization
   Relate aspects of the enacted problem situation to current real-life problem. Explore general principles of behavior.

The teacher assumes the responsibility for structuring the sessions, initiates the various steps of the model, and guides the students within each step. Students, on the other hand, determine the content and shape the enactment of the problem.

Application:
Role playing not only is used to improve social skills and self- and social awareness, but also serves as a highly useful tool to practice specific skills. For example, in a career guidance program this technique is often used to practice job interview skills.

Other models which utilize role playing to explore problems, are Psychodrama, for example, which is used in the area of psychotherapy, and Social Simulation, which uses interactive games to help students experience various social processes, to examine their reactions to them, and to develop decision-making skills.

Role playing can be adapted for the use with students from K-12 as well as adults.

3.5 COOPERATIVE MODELS OF INSTRUCTION

Cooperative instructional strategies are characterized by the placing of students into small, interdependent groups which are heterogeneous in terms of ability, race, culture and sex, and in which the members help each other while working toward a common academic goal. A variety of different cooperative methods have been designed. Among them are: Student Team-Achievement Divisions, Teams-Games-Tournaments (both were developed at the John Hopkins University), Jigsaw and Jigsaw II (developed by Aronson et. al.), Learning Together (developed by Johnson and Johnson), CO-OPCO-CO (developed by Kagan), and Group Investigation (developed by Thelen). Despite variations in procedures, all methods apply two central principles:

- cooperative incentives and
- cooperative task structures.

This chapter will briefly describe "Group Investigation" as one example of these cooperative models. For more information on any of the other techniques, the interested reader is referred to the writings of the authors of these theories.

Group Investigation:
Thelen's Group Investigation Model combines principles and dynamics of the democratic process with those of academic inquiry. The classroom is seen as analogous to a larger society. Therefore, as in society in general, students have a natural urge to create a working social order for their own "microsociety." The energies, which are generated by this urge, can be channeled through the technique of group investigation, to accomplish intellectual as well as social goals.

Basic Concepts:
Three concepts are central to group investigation: inquiry, knowledge, and the dynamics of the group.

Inquiry needs as its motivator an event or problem which generates puzzlement or curiosity. Although the teacher may provide the students with the problem situation, the students will have to be the ones who identify the specific parameters of the problem, who formulate a plan of action, and who work actively on its solution. Genuine inquiry by students will not occur if the teacher carries the main responsibility or if the end-product precedes the "inquiry" process.

Knowledge is the final goal of inquiry. For Thelen, knowledge is the "application of the universals and

principles drawn from past experience to present experience."

Dynamics of the Group:
The group context, in which individuals are confronted with various reactions, alternatives, opinions, personal needs and ways of approaching problems, facilitates this experiential knowledge.

Method:
The following series of stages is suggested by Thelen for Group Investigation:

1) Problem Situation
students encounter (planned or unplanned) a problem situation which may be in the form of a verbally presented hypothetical situation, or it may be a "real life" experience.

2) Reaction to the Problem
Students explore their reactions to the problem.

3) Problem Definition
Students organize a plan of action, (e.g., assign study tasks, roles, etc.).

4) Independent and Group Study
Students pursue independently and in groups their assigned tasks.

5) Analysis of Progress
Students analyze their progress and the process involved.

6) Recycle Activity
Based on the conclusions of the analysis the cycle is repeated with new problems which may have grown out of the previous process. All decisions and activities are guided by the principles of the democratic process. Structure is not imposed externally, but based on group decisions made by the students. Teachers play a facilitative role and function as "academic counsellors."

Application:
Cooperative teaching strategies can be used in most subject areas and across all grade levels. They appear to be specifically beneficial for children of native ancestry because of the non-competitive nature of these strategies.

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4 BEHAVIORAL ORIENTED STRATEGIES

The behaviorally oriented strategies are based on principles advanced by classical and operant conditioning theory. Extensive research has demonstrated the effectiveness of behavioral methods for a broad spectrum of applications including educational ones. Some basic assumptions underly all the behavioral strategies. Among them are the following:

- behavior is lawful and subject to external variables of the environment
- maladaptive behavior is acquired through learning
- therefore, it can be modified through the learning processes
- regardless of the broad goal, behavioral goals need to be specific, discrete and individualized

4.1 MASTERY LEARNING, INDIVIDUALLY PRESCRIBED INSTRUCTION AND DIRECT INSTRUCTION

This chapter briefly discusses three behavioral strategies which all have as their main goal the mastery of content. They are based on the assumption that if goals are precisely defined most students will be able to reach an acceptable degree of competence on any given task.

Mastery Learning:
The concept of Mastery Learning is based on John Carroll's definition of aptitude as the amount of time it takes someone to learn any given material. This definition has several important implications: It suggests that:

- if sufficient time is provided almost anybody can master any given subject
- instruction (time and method) has to be geared to individual student's needs

The degree of mastery of any subject, therefore, according to Carroll, depends on the following variables:

- time allowed
- perseverance of the student
- quality of instruction
- ability of the student to understand the instruction
- the student's aptitude

Carroll's ideas have been transformed by Bloom and others into specific instructional strategies. The

following characteristics are typical of most of these models:

1) Mastery is defined in terms of a set of major objectives.
2) The domain which is to be learned is then divided into a set of relatively small units, each with their own set of objectives.
3) Learning material is identified and appropriate instructional strategies are selected.
4) Units are accompanied by brief diagnostic tests which monitor student progress and identify problem areas.
5) Based on this test data, individualized additional instruction is provided.

Individually Prescribed Instruction:
Different behavioral models emphasize different aspects of behavioral theory. For example, Individually Prescribed Instruction (IPI), as the name implies, puts its central focus on gearing instruction to the needs of each individual student. To this end, environmental conditions in the classrom have to be arranged so that each student can work at its own pace through a sequence of instructional units. Only if a specified minimum degree of competence is acquired does he/she proceed to the next unit. Therefore, emphasis is placed on frequent evaluation.

Since careful sequencing of material is essential to the success of this model, objectives need to be specific and carefully chosen so as to provide meaningful streams of content with each one building on the preceding one. Units are designed to represent different levels of progress and to provide logical break-points in the material.

An example of this type of behavioral model, with the central focus on individualized instruction is the Language Laboratory which has proven extemely useful in the teaching of foreign languages.

Direct Instruction:
This model of instruction has proven to be effective specifically in the areas of reading, mathematics, and the acquisition of basic skills; in particular with students from lower socioeconomic backgrounds. The technique serves an important function within the total educational picture. Despite this general usefulness, it has to be kept in mind, that this strategy should not be used exclusively since studies indicate it may not adequately promote abstract thinking skills, creativity, and problem solving.

Method:
The learning environment during Direct Instruction is task centered, teacher directed, and highly structured.

On the most general level this strategy involves 1) the teacher explaining a new concept to the large group, 2) the testing of student-understanding by controlled practice, 3) continued guided practice under the teacher's supervision, and finally 4) independent practice by the student. Since this model places so heavy an emphasis on practice it is sometimes referred to as Practice Model.

The steps, then, which characterize the Direct Instruction Approach may be summarized as follows (adapted from Joyce and Weil, 1986):

1) Orientation
   Teacher establishes framework of lesson
   Teacher orients students to new material
   Teacher reviews previous relevant learning
   Teacher clarifies purpose of the lesson
   Teacher explains the procedures for the lesson

2) Presentation
   Teacher presents new concept or skill
   Teacher provides representation of task
   Teacher checks for students' understanding by convergent questioning
   Teacher provides feedback to students' responses

3) Structured Practice
   Teacher guides students through practice in lock step fashion (often with use of overhead)
   Students respond to questions
   Teacher provides corrective feedback for error responses and reinforces correct practice
   Visual representation of the task (VRT) is available

4) Guided Practice
   Students practice semi-independently (teacher is in room)
   Teacher monitors student's practice (circulates)
   Teacher provides corrective feedback where necessary
   Teacher refers students to VRT as a resource

5) Independent Practice
Students practice on their own (after achieving accuracy level of 85-90%) either in the classroom or at home
Feedback is delayed
Independent study occurs several times over an extended period

Applications:
The three strategies which were outlined above all can be adapted for use with students from K-12 and adults.

Mastery learning and individually prescribed instruction are most helpful in any highly skill-oriented subject area (e.g., typing), but may be successfully used in almost any subject area.

Direct instruction is a most effective strategy in the beginning levels of basic skills instruction (e.g., mathematics and reading.)

4.2 CONTINGENCY MANAGEMENT

Contingency management is the most common application of behavior theory in educational settings. It is based on the systematic control of reinforcing stimuli after the desired response has been made. In other words, it is based on the principle of operant conditioning in that desirable behavior is reinforced and undesirable behavior is ignored with the consequence of extinguishing undesirable behavior or instilling desirable behavior.

Reinforcers may be in one of three forms:
- social, praise, a smile, attention, etc.
- material, candy, toys, tokens, etc.
- activity, once a (for the student) less desirable activity (e.g., study) is completed satisfactorily, reinforcement is provided, by the privilege to partake in a more desirable activity (e.g., play, recess, crafts, reading, etc.).

The choice of the appropriate reinforcer is crucially important for the success of contingency management.

Method:
Contingency management follows five basic phases: 1) specifying the desired final performance, 2) assessing the current behavior (baseline), 3) formulating the contingency management programs, 4) implementing the program, and 5) evaluating the program.

Phase One: The specifying of the desired final behavior involves:
- the identification of the target behavior,
- specification of the behavioral outcome (Which is the response to be reinforced? What is the behavioral objective?),
- developing a scheme for measuring the behavior (e.g., specimen description, time sampling).

Phase Two: The assessing of the entering behavior involves:
- observing and recording of frequence and/or nature and context of relevant behavior (establishing the baseline).

Phase Three: The formulation of the contingency management plan involves:
- planning appropriate structure of the environment (e.g., physical environment, learning materials, etc.),

- selecting appropriate reinforcers according to student characteristics,
- formulating behavior-shaping procedures (gradual withdrawal of cues).

Phase Four: The implementation of the contingency management plan involves:
- the arranging of the learning environment according to plan (see phase three),
- the informing of the students of target behavior and reinforcers (some other behavioral models do not include this step),
- maintaining the reinforcement and behavior-shaping schedules.

Phase Five: The evaluation phase involves:
- deliberately structured evaluation of the success of the program according to the original behavioral objectives.

The social atmosphere, in this model, is highly structured by the teacher through a planned reward system and the carefully designed environment.

Application:
Contingency management has been shown to be successful in reducing a variety of maladaptive behaviors. It has further proven to be useful, in developing new desirable behaviors. The strategy can be used to develop social and self-management skills, as well as academic skills. Finally, contingency management is an effective technique for maintaining existing desirable behaviors.

The strategy can be adapted for all grade levels but is most appropriate at the lower grade levels.

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5 INFORMATION PROCESSING STRATEGIES

The information processing strategies share a commmon emphasis on intellectual development. The focus in this group of strategies is on how students process, organize, and analyze information, as well as on the way problems are articulated, and solutions are generated. The particular strategies which are discussed in this section deal with: concept attainment, ways to provide advance organizers for the structuring of content material, techniques which promote deductive and scientific thinking processes, as well as inquiry techniques. Further this section looks at a strategy, based on Piaget's theory which focuses on gearing instruction to stages of maturity in students, and finally, a strategy which is designed to enhance the ability to assimilate and retain information, is briefly discussed.

5.1 CONCEPT ATTAINMENT

Concept Attainment is based on the work of Bruner and his associates. The prime goal of this strategy is to develop inductive thinking through concept development and analysis. It involves relatively easy to learn steps, but requires a good understanding, by the teacher, of the theoretical background if it is to be truly effective as a tool to teach conceptual thinking.

Since the relevant aspects of Bruner's theory were discussed in Part I section 2.2.3, theoretical background to the concept attainment model will not be reiterated here.

Generally, in the Concept Attainment Model, clues are supplied by the teacher from which students are to determine the identity of concepts. In contrast, in the Inductive Thinking Model, which is described in the next section, students are engaged in the process of concept formation (see Part I section 2.2.3) by grouping examples together on a variety of bases to form as many conceptual groups as possible.

Concepts:
Concepts, according to Bruner, have five elements: names, examples, attributes, values, and rules. Since these elements have crucial implications for the structure of the concept attainment method, they will be briefly described here:

1) The name of the concept is the term given to a particular category (e.g., cat, tree, school, etc.).

2) Examples are the instances of a concept. In the initial stages of the strategy the teacher will supply the students with positive examples of the concept (those examples which are instances of it) and negative examples (those which are not instances of the concept). Students learn to recognize positive examples of the concept as well as negative examples, even if these are closely related.

3) Attributes are those features which place examples into a given category. Essential attributes are those without which an example could not be considered as belonging to the category.

4) Since most examples (objects, events) are not standardized but instead occur in a great variety, attributes have a value range within which the example qualifies for the concept under consideration. For example, apples can be of a variety of roundish shapes, but if the example is too oblong, it does not any longer qualify for the concept "apple" but may well be an example of the concept "pear" (if other essential attributes for "pear" are also present).

5) A rule is a statement which specifies the essential attributes of any given concept. In the classroom setting, rules generally are developed toward the end of the concept attainment process.

In summary, then, concepts are distinguished from one another by their distinguishing attributes and by the range and value of their essential or critical attributes. This information can be combined to formulate a rule which specifies the essential characteristics of a concept.

Noisy Attributes:
One of the difficulties which exists when concepts have to be learned through observation in the "real world" is that examples do not appear in their pure form (meaning only with their typical and critical attributes) but that they generally are embedded in many nonessential features. Bruner refers to these nonessential attributes as noisy attributes. It is the teacher's task, when teaching students new concepts, to "remove the noise" from the examples.

Concept attainment can occur under two distinctly different learning conditions which Bruner called selection-, and reception conditions. When selection conditions are present, examples are not identified as "yes" or "no", instead, the learner selects from a pool of unmarked examples those which are part of the concept. When reception conditions are present, examples are clearly marked as "yes" and "no". Depending on which condition exists, different thinking strategies are employed, and consequently methods of instruction also differ accordingly.

Method:
The Concept Attainment model which is appropriate under reception condition involves the following steps:

1) The presentation of examples and the identification of the concept involves that:

   - labelled ("yes", "no"), carefully selected examples are presented to students

   - attributes of examples are compared by students

   - students develop and test their hypothesis about the concept

   - students formulate the rule of the concept

2) The students testing of their attainment of the concept involves that:

   - students identify new, unlabelled examples as belonging or not belonging to the concept

   - the original hypothesis is rejected or confirmed

   - students generate additional examples of the concept

3) The thinking strategies which were employed are analyzed. This involves that:

   - students describe their thoughts which lead them to the hypothesis

   - students discuss the roles of attributes and hypothesis

This reception model of teaching for concept attainment focuses on familiarizing students with the basic elements of "concepts" and how these are used to form concepts.

In the selection model of concept attainment, examples are presented unlabelled, and it is up to the students to find out whether they are "yes" or "no" examples by asking questions, forming more examples, testing hypothesis and formulating rules. This model moves students closer to the ability to identify concepts in natural, unorganized, non-classroom situations and to conceptual thinking in general.

All concept attainment strategies require a relatively structured environment with the teacher, especially in the early stages, controlling the process. Materials and examples have to be carefully selected and presented.

Application:
Concept attainment strategies may be used: to teach new concepts, to teach the process of concept attainment, and to advance inductive thinking in general. The strategy helps students to think conceptually by enabling them to sort more effectively through the multitude of data which surrounds them. Concept Attainment can be used with appropriate adaptations for all grade levels.

5.2 INDUCTIVE THINKING

The Inductive Thinking Model was developed by Hilda Taba. It incorporates several teaching strategies which are aimed at developing inductive thinking processes. Although Taba's model, like Bruner's, focuses on conceptual thought (and in fact uses Bruner's notion of concept as its theoretical base) it reaches beyond concept formation as its major goal for instruction. Instead, its mandate is the systematic teaching of logical, conceptual thought processes for the purpose of interpreting data, the predicting of consequences which might arise out of the data, and of conditions which were established earlier in the process.

The three strategies which constitute the basic instructional framework for Taba's model, therefore, each address one of the following instructional goals: concept formation, interpretation of data, and the application of principles. Taba's model has been most noted for its use in social studies curricula. Because the skills and insights which are gained through the use of each of the three strategies build on each other, these strategies have to be used sequentially.

Method:
Each of the three strategies consist of three steps. For each step Taba describes the kind of activity which is carried out, the mental operations the students perform, and typical questions which the teacher might use to elicit appropriate student responses.

Although the strategies appear rather similar on the surface, the subtle differences in method and goal allow teachers to lead their students to delve into the given subject at increasingly complex levels.

Strategy One - Concept Formation:

Step one:
Activity: Identify and enumerate data which is relevant to the subject or problem.
Mental Operation: Differentiation.
Typical Questions: What did you see/hear?

Step two:
Activity: Group the items which were identified according to similarities.
Mental Operation: Abstraction.

Typical Questions: What belongs together? What are the reasons for this? On what basis...?

Step three:
Activity: Categories for the groupings are found and labelled.
Mental Operations: Hierarchical item organization.
Typical Questions: What belongs to what? How could you call this group? Which one is the more important/more general group?

Strategy Two - Interpretation of Data:

Step one:
Activity: Important aspects of the data are identified by the students.
Mental Operations: Differentiating.
Typical Questions: What did you discover, notice, find?

Step two:
Activity: Students explain aspects of the identified information and relate them to each other.
Mental Operations: Determining cause/effect connections, discovering relationships.
Typical Questions: Why did this happen? How does it relate to...?

Step three:
Activity: Students make inferences based on the information which has been accumulated, they are reaching beyond the strict confines of the data.
Mental Operations: Extrapolating, finding implications.
Typical Questions: What effect could this have? What does this mean in relationship to...? What might be the consequences?

Strategy Three - Application of Principles:

Step one:
Activity: Students try to predict consequences of the data. They attempt to explain unfamiliar aspects of the problem, and form hypothesis.
Mental Operations: Analyzing and retrieving knowledge.
Typical Questions: What would happen if?

Step two:
Activity: Explanations and supporting arguments for the hypothesis are sought.
Mental Operations: Exploration of causal relationships.
Typical Questions: Why do you think this would happen? What might be the reasons for...?

Step three:
Activity: Predictions are verified by the students. Conditions which would verify predictions are identified.
Mental Operations: Logical methods and factual information are used to determine necessary and sufficient conditions.
Typical Questions: Under what conditions would this always be true? Under what conditions would this generally be true?

In general, the Inductive Thinking Model works best in a classroom atmosphere of cooperativeness. The teacher provides a fair amount of guidance through his questioning techniques, especially in the earlier phases and as long as the technique is new to the students. The teacher closely monitors the students' level of information processing (through their answers) so that he can implement the appropriate strategy.

Application:
Inductive Thinking strategies were first used in the area of social studies, but since the primary goal of this technique is to develop thinking capacity, it is very well adaptable to other curricula (e.g., English, Science). The model, especially the concept formation part, can be adapted for use with relatively young children. The strategy as a whole, though, is particularly suitable for middle and upper grades, to help these students to process a large amount of information, as well as to promote more general goals such as the development of an increased sensitivity to language, the familiarization with logical thinking processes, as well as concept formation.

5.3 INQUIRY TECHNIQUES

The inquiry techniques which are described here, view the concept of "inquiry" in the academic/ scientific sense. To inquire here means to look at a problem analytically, to examine the data related to the problem, and to develop and test hypotheses.

Typical examples of such strategies are:

- The Biological Science Inquiry Model, (developed by Schwab in the 1960s) which focuses on teaching of the research system which is used in biology, but which may be applied to other domains as well. In this model, real-life scientific studies are described with a certain crucial part being omitted in the description (e.g., design of the study, how to control for a crucial variable, how to draw conclusions from the data, etc.). During the course of each lesson, students work to "fill in" the missing part. This strategy conveys both the process of biological inquiry, and subject matter to the students.

- The Social Inquiry Model (developed by Byron Massialas and Cox, 1966) uses the method of scientific inquiry in order to reflect upon and examine values and issues which affect our present society. The strategy involves the presentation of a dilemma to the students, who in turn:
  - develop and clarify hypotheses,
  - explore assumptions and implications,
  - explore the validity of assumption and data,
  - gather facts to support or question hypotheses, and
  - formulate a solution or generalized statement concerning the dilemma.

The Inquiry Training Model:
This model was developed by Suchman, 1962. Like the models which were described above it is based on methods used in scientific inquiry. This model is discussed here in more detail.

The Inquiry Training Model is strongly process oriented, focusing on process skills involved in scientific inquiry such as:
- observing, collecting and organizing data,
- identifying and controlling variables,
- developing and testing hypotheses, and
- making inferences from data.

These skills, translate into a technique of disciplined searching for answers to puzzling questions. According to Suchman, a further aim of this technique is to impress upon students the notion that all knowledge is tentative, open to questioning, and to alternative explorations.

If properly implemented, the technique should result in its ultimate goal, the development of independent learners.

Method:
Suchman formulated a number of rules which are essential for the success of this model:

1) Student questions should be phrased in such a way that they can be answered by the teacher with "yes" or "no." This encourages students to think independently and form "mini-hypotheses."

2) Once called upon, a student may ask as many questions as he/she wishes. Students should not feel pressured to give up the floor before their line of questioning is completed.

3) Statements of theories are not answered with "yes" or "no" by the teacher, instead students will be encouraged to test their theories.

4) Any student can test any theory at any time. Students are encouraged to discuss each other's theories.

5) Students are allowed to confer with one another regarding their theories in order to facilitate cross-fertilization of ideas.

6) The learning environment should provide information (e.g., resource books, experimental kits, idea books).

These rules shape the class climate and the interaction patterns between students and teacher. The process itself, involves five distinct phases which are traversed in sequence:

Phase One:
- The rules of the inquiry process are explained to the students.

- A puzzling or discrepant event is presented. It is important that the event or problem is chosen carefully (the outcome has to be surprising and not easily predictable) so that it truly generates a spirit of inquiry.

Phase Two:
- Data is gathered and verified.
- Student questions at this stage are limited to finding out about the identity and nature of objects and conditions surrounding the puzzling situation. (Facts are verified.)

Phase Three:
- More data is gathered and analyzed.
- Student questions now seek to explore relationships between variables.
- Verbal and actual experiments are carried out to explore these relationships.
- Students are made aware of the difference between questions aimed at verifying facts and those which explore relationships.
- Students hypothesize about causal relationships.

Phase Four:
- Rules, which attempt to fully explain the problem, are formulated and discussed.

Phase Five:
- The inquiry process is analyzed.
- The strategy is examined.
- More effective strategies are developed.

The process in this strategy is largely controlled by the teacher but the intellectual environment has to be open so that all relevant ideas are heard and seriously considered. Inquiry into <u>everything</u> should be strongly encouraged, both data and possible solutions should be open to questioning at all times. The teacher is responsible for the selection of the problem, the teaching and maintaining of the proper procedures, and the facilitating of open discussion. As students become more familiar with the model, some of these functions may be carried out by the students themselves.

Application:
Since Inquiry Training was originally based on the methodology of natural science research, the natural sciences were its original area of application. But the model has proven also applicable for other subjects such as Social Studies and English to name just two.

In fact, any subject where one may deal with problems which do not have readily apparent solutions or explanations, may benefit from this teaching strategy.

Since the central aim of Inquiry Training is the development of independent learners and since it actively promotes critical thinking strategies, Inquiry Training effectively promotes two of the common essential learnings which have been named as necessary for all students by the Core Curriculum Advisory Committee.

Although this strategy, like most, can by a skillful teacher be adapted to all grade levels, it is most appropriate with those children who have some basic skills in place, since it requires some independent work by students.

5.4 ADVANCE ORGANIZER MODEL

This model, which was developed by David Ausubel, has as its main goal the facilitation of meaningful learning of subject matter. Therefore, in contrast to the three information processing techniques which were previously described, Ausubel focuses on content learning rather than on process learning.

The model provides strategies which are aimed at improving the presentational methods of teachers, by providing them with a framework for effctively presenting large amounts of information as meaningfully and efficiently as possible.

Basic Assumptions:

- Ausubel holds that learning by way of lecture-type presentations does not necessarily have to be in the form of rote memorization, especially if material is presented in such a way that new material is put into its proper global and contextual framework.

- Meaningful learning, according to Ausubel, entails the relating and reconciliation of what the learner already knows with the newly learned material. This connection between previous knowledge and newly acquired knowledge allows for the application of the new material to a variety of new contextual settings (transferability).

- Receptive learning (as it occurs during lectures) has often been criticized as passive learning. Ausubel strongly disagrees with this notion, pointing out that the receptive learner has to perform a number of important, active mental operations in order to make the new material meaningful. Among these are:

    - the relating of new material to existing knowledge,
    - deciding on the appropriate concept under which to mentally "file" the new knowledge,
    - looking at the new material from different angles,
    - reconciling it with previous information, and
    - attaching it to a new terminology.

Since these operations, according to Ausubel, are not generally easily performed spontaneously, this model proposes to assist students with these mental operations.

Ausubel further believes that the cognitive structures people form in their minds, are directly related to the way the subject matter was organized when it was presented. He believes that each discipline has a unique hierarchical structure of relevant concepts and that it is the role of the lecturer/teacher to relate new subject matter to this structure. He further maintains that new material is only truly understood, retained, and transferrable if it is related to the existing knowledge and to the appropriate hierarchical, conceptual framework. Therefore, the model emphasizes the importance of, both, sequencing and hierarchically structuring of new learning material.

Advance Organizers:
The main idea in this method is, as the name implies, to provide the students with advance organizers (ideational anchors). Ausubel describes these as follows:

> An Advance Organizer is introductory material that is presented ahead of the learning task and is at a higher level of abstraction and inclusiveness than the learning task itself. Its purpose is to explain, integrate, and interrelate material...with previously learned material. (Ausubel, Educational Psychololgy, p. 152).

There are two types of advance organizers:

- Expository advance organizers are most useful for use with relatively unfamiliar subject matter. They provide a general scaffolding, a hierarchical structure, to which new material can be related.

- Comparative advance organizers are more useful with fairly familiar material. They relate new concepts to other, more or less similar ones. They establish similarities and differences between those closely related concepts, thus preventing confusion and allowing for differentiation of related concepts.

Method:
The strategy is composed of three major phases.
Phase One: The presentation of the Advance Organizer involves:

- explaining the aims of the lesson to students,

- organizing (scaffolding) of subject matter which involves the following:
  - critical attributes are identified,
  - related examples are given,
  - the concept is related to other similar concepts,
  - related terminology is repeated, and
  - relevant previously acquired knowledge is brought back into the students' awareness.

Phase Two: <u>The presentation of the new material involves</u>:

- the presenting of new material in a form which makes the logical order and/or hierarchical structure of the learning material explicit,

- the relating back of material to the advance organizer.

Phase Three: <u>The strengthening of the newly formed cognitive organization involves</u>:

- the integrative reconciliation of the new material,

  To do this the teacher can:

  - remind the students of the larger context,
  - ask for a summary of the main aspects of the new material,
  - repeat definitions,
  - explore with the students differences as well as parallels to related material,
  - the promotion of active reception learning;

  To encourage this the teacher may:

  - ask students to relate the new material to a single aspect of their previous knowledge,
  - elicit additional examples of the new concept or material,
  - encourage students to translate the essence of the new knowledge into their own terminology or frame of reference,
  - have students examine the concept from different points of view,

- have students relate the new knowledge to other knowledge of a contradictory nature.

In general, the strategy of using Advance Organizers requires the teacher to help the students, not only to gain new factual knowledge, but also to put this knowledge in the context of existing, previously acquired, frames of reference, both, in terms of the students' intellectual and experiential background.

The strategy is teacher oriented and controlled but requires a climate which allows for free and open communication. The teacher's responses to students are aimed at clarifying facts, as well as relationships between facts, and at promoting a critical approach to knowledge.

Application:
As mentioned earlier, the strategy is highly useful for structuring lecture-type presentation in such a way, that students will become active, rather than passive, learners. Although basically teacher oriented, it is believed to transmit skills which will promote independent learning. The model provides a framework for the acquisition and mastery of facts, a way of relating new facts or concepts to existing cognitive structures, and it assists in the transferability of knowledge to applications in different contexts. Therefore the technique is particularly useful for those subjects or situations where a large amount of conceptually interrelated knowledge needs to be conveyed, for example, when introducing the key concepts of a new discipline. The model is particularly appropriate for use with students in the middle and upper years, but may be successfully adapted for working with younger children.

5.5 MEMORY MODEL

As mentioned in chapter 2.2 of Part I of this document, memory plays a crucial part in the processing of information, as well as in knowledge acquisition and in reasoning capacity. For these reasons, an instructional and self-monitoring strategy which explicitly focuses on the improvement of memory capacity, seems to be of great practical value.

The strategy which is described here was developed by Harry Lorayne and Jerry Lucas and popularized in "The Memory Book" (1974).

Basic Assumptions:
The process of memorization is one of information processing. From the many stimuli in the environment, first only those which attract the individual's attention enter into short-term memory, second, of these, only those which are "rehearsed" enter long-term memory. Third, only if we develop retrieval cues during rehearsal, are we able to recall the information.

Memory can be improved by applying strategies to improve the ability to attend to information, as well as to develop sensory, episodic, and categorical cues.

Basic Concepts:
The following concepts are essential components of most memory enhancing strategies.

Awareness Only what has entered our conscious awareness can be remembered.

Association New pieces of information can be easier remembered if they are associated to already existing knowledge.

Link System Most memory problems may be broken down into groups of two connected ideas. To enhance memory of several unrelated ideas, Lorayne and Lucas suggest the forming of ideational or visual links between the items which are to be remembered.

Ridiculous Associations The stronger the image of the association, the easier it is to remember. The more illogical, ridiculous, or impossible these images are, the easier it is to remember the information which is associated with them.

These effects may be achieved in several ways:
- by the rule of substitution (horse rides man),
- by the rule of exchanging proportions (small things become gigantic),
- by the rule of exaggeration, and
- by the rule of action association.

Substitute Word System This is a method by which the apparently abstract is made into something concrete or meaningful. Through this technique, the sound of a word which is to be remembered may be used as a trigger to generate a concrete association. For example, the word ALASKA is remembered by way of the phrase "I'll ask her."

Key Word Finally, when a relatively long phrase or thought has to be remembered, a key word is selected to represent the whole thought. This word should be the one which represents the main idea of the thought.

Method:
The memory model includes four distinct phases which elaborate on the previously discussed critical steps of memory, namely attending to the material, establishing connections, expanding images, and practicing recall.

Phase One: Attending to the learning material
Techniques are used that help students to concentrate on the material:
- identifying main ideas by: underlining, reflecting, listing, comparing, clarifying and rephrasing

Phase Two: Developing connections
Material is made familiar and connections are established. Techniques used are:
- link systems, key words, substitute words, associations

Phase Three: Expanding of images
Whereas the previous phase established initial associations, this stage seeks to enhance the images. Techniques used here are:
- ridiculous associations, exaggerations, humorous dramatizations

Phase Four: Practice and recall
Finally students are encouraged to practice and asked to recall the material.

Overall, the memory model calls for a cooperative classroom atmosphere and a sense of team spirit.

The teacher explains and facilitates the movement through the various stages.

Application:
The model is applicable to all areas of the curriculum. It may be taught to groups as well as individuals. Perhaps the most valuable aspect of this model is its potential for enhancing students independent study skills. For this effect to be present, it is essential that the teacher makes the process and techniques explicit to the students, so that they, in turn, can use it on their own to enhance their memory skills. The strategy is useful for students from K-12 as well as adults.

5.6 COGNITIVE GROWTH

A number of instructional strategies have been developed which are to a greater or lesser degree based on the theoretical work of Piaget. These strategies have in common an emphasis on concrete experiences of play and problem solving, and a careful gearing of the learning task to the developmental state of the students. While some strategies concur with Piaget's stance of not rushing students' development, others promote techniques which are geared at accelerating intellectual development. The model which is presented here calls for the gearing of curriculum and instructional strategies to the learner's developmental stage, emphasizing broadening intellectual experiences rather than accelerating intellectual development.

Teaching strategies which emphasize development in the Piagean sense are basically clinical in nature, in that the teacher continually assesses students' intellectual development, selects tasks which are appropriate for the developmental status of the students, analyses students' responses in terms of developmental criteria, and reacts to students in a way that promotes student development.

Since the basic assumptions which underly Piaget's theory as well as the characteristics of his stages of cognitive development were described in Part I of this document, this chapter will not reiterate this information.

Method:
The method described here is based on Piaget's "clinical interview" which is aimed at determining the child's stage of reasoning by carefully planned questioning which is aimed at testing the child's limits of reasoning.

The model consists of three phases:

Phase One: Confrontation with a task which is relevant to the developmental stage of the students.
The choice of the task has to be carefully geared to the developmental stage of the students. The task should be familiar enough to allow for assimilation to take place, while at the same time novel enough to require some accommodation (see Part I section 2.3). The confrontation with the task may involve verbal, nonverbal or environmental interactions.

Phase Two: Inquiry into students' levels of reasoning.
The teacher probes into students' level of reasoning by asking for justification of his/her responses and by offering counter suggestions.

Phase Three: Transfer.
Students' reasoning will be applied to related tasks.

Overall, this strategy requires that the teacher is very familiar with Piaget's theory so that he/she may choose stage-appropriate learning tasks and provide maximal learning environments, both, with regard to the physical and organizational arrangements, and his/her own interactions with the students. The classroom environment may range from a very structural one, in which the teacher initiates and guides most activities and interactions, to a minimally structured one, where the learning process is to a greater or lesser degree student guided. In any case, the strategy calls for a social atmosphere which fosters free, intellectual exchange.

Application:
The model is useful for promoting social as well as cognitive development. It may be used with individual students, for example in tutoring or assessment settings, but is equally well suited for classroom application.

Although Piaget's "clinical interview" was originally developed for the assessment of logical/mathematical thought, it can easily be adapted to other developmentally oriented frameworks. It has, for example been successfully applied to Kohlberg's theory of moral development (see Part I, 1.2).

5.7 SUPPLEMENTARY READINGS (Information Processing Strategies)

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5.8 SUMMARY OF INSTRUCTIONAL STRATEGIES

Part II of this document provided "thumbsketch" outlines of the characteristics of some of the more important instructional strategies. This brief and selective overview points to the diversity of options, not only with regard to the number of choices, but also with regard to the extent of differences of approaches which are represented by these strategies. Some of these differences are the result of:

- various philosophical and theoretical views about the nature of the learner (see Part I, Section 1),
- various beliefs and theoretical views about the learning process (see Part I, Section 2).

Other differences are due to the diversity of goals which form the mission of each of these strategies. When considering all strategies, these goals have a rather wide spectrum but within each of the major groups (personal/social, behavioral, and information processing) a great deal of overlap and agreement exist.

For example, the personal/social strategies as a group, to a greater or lesser degree, seek to:

- develop self-awareness,
- facilitate personal and interpersonal growth,
- improve interpersonal and social skills,
- develop cooperative behavior,
- instill a sense of personal responsibility,
- promote a broadening of perspectives,
- develop personal and interpersonal problem-solving skills,
- promote creativity.

The behavioral strategies, which were described here, seek to:

- facilitate the teaching of facts, concepts and skills,
- promote socially acceptable behavior,
- facilitate learning for all students at their own pace.

The information-processing strategies seek to:

- facilitate the processing of information,
- develop critical thinking,
- develop inductive thinking,
- promote meaningful content learning,
- develop conceptual thinking,
- teach independent study skills,
- enhance memory capacity,
- deepen and or accelerate cognitive development.

Although there is a great deal of overlap with regard to suitable areas of application for the various strategies, with many of them indeed being applicable across most areas of the curriculum, some strategies are particularly well suited for certain subject areas.

In general, the personal/social strategies are most useful for group guidance activities, affective education and personal and creative problem solving sessions. Nevertheless, most of these strategies may also be adapted to a variety of other curricular areas, such as English, Social Studies, etc.

The behavioral strategies are particularly well suited for highly skill oriented subject areas. But these strategies also have been found very useful for the teaching of more academic subject matter, as well as for general classroom management and behavioral intervention.

Finally, the information-processing strategies are most suitable for areas of the curriculum where large amounts of subject matter have to be related by the teacher, and processed, stored, and at the appropriate time retrieved by the students. Since these conditions apply to most school subject areas, the information-processing strategies are appropriate for a wide range of applications but are particularly useful in subject areas such as the natural and social sciences, social studies and English.

In summary,
- strategies are most clearly distinguished by their main goals or missions,
- they are generally adaptable for use with most grade levels although some are more commonly used with either younger or older students,
- strategies show considerable overlap in area of application as well as goals especially within each of the main groups of strategies.

The choice of strategy for any given teaching situation, therefore, is not a matter of any one absolutely right or wrong model, but rather a matter of matching subject matter constraints, student characteristics, and the overall objective of the lesson, since any given strategy has the power to transform both content and material through the kind of emphasis and process it uses. In other words, the same science content taught, for example, as a concept attainment lesson,

or using advance organizers, will leave students with very different skills, thoughts and values, as well as with different ways of relating and transferring the newly learned material to previous learning and to new situations.

Table VIII: Summary of Instructional Strategies (Personal/Social)

Strategy	Theorist	Main Goals	Applications	Grade Level
Synectics	Gordon	-to develop creative problem solving skills -to promote broadening of perspectives	-most subject areas specifically: creative writing exploring problems product design	-middle and upper grades -adults
Awareness Training	Perls Schutz	-to develop self-awareness -to promote self-direction -to instill responsibility for own actions	-affective education -group counselling	-adaptable for K-12 students and adults
Classroom Meeting	Glasser	-to facilitate interpersonal growth -to develop a sense of responsibility	-affective education -group guidance -interpersonal problem solving	-adaptable for K-12 students and adults
Laboratory Training (T-Groups)	Lewin	-to improve interpersonal relations -to promote personal flexibility	-small group settings -for extended time periods -removed from day-to-day school setting	-upper grades and adults
Role Playing	Shaftel	-to improve social skills -to improve self-awareness -to practice behavior for specific social situations	-group counselling -career guidance	-adaptable for K-12 students and adults
Cooperative Learning (Group Investigation)	Thelen	-to develop cooperative behavior -to develop knowledge acquisition skills -to promote "genuine" inquiry	-most subject areas	-adaptable for K-12 students -particularly useful for use with children of native ancestry

Table IX: Summary of Instructional Strategies (Behavioral)

Strategy	Theorist	Main Goals	Applications	Grade Level
Mastery Learning Models	Carroll Bloom Gagné	-to facilitate learning for all students -to teach individual students according to their own pace	-most subject areas -specifically highly skill oriented areas -foreign languages, mathematics, typing, etc.	-adaptable for K-12 students and adults
Contingency Management	Skinner	-to teach facts -to teach concepts -to teach skills -to promote socially acceptable behavior	-general classroom management -teaching academic skills -special education -behavioral intervention	-adaptable for all grade levels -most appropriate at lower grades

Table X: Summary of Instructional Strategies (Information Processing)

Strategy	Theorist	Main Goals	Applications	Grade Level
Concept Attainment	Bruner	-to develop inductive thinking skills	-to teach new concepts -to teach the process of concept attainment	-adaptable to all grade levels
Inductive Thinking	Taba	+to develop skills of scientific inquiry +to develop critical thinking skills +to teach logical, conceptual thought	-specifically well suited for Social Studies -adaptable to other areas of the curriculum (e.g., English, Science)	-middle and upper grades -may be adapted for use with younger children
Inquiry Techniques	Schwab Byron et. al Suchman	+to develop research skills +to develop independent learning skills	-natural science -social science -English	-middle and upper grades
Advance Organizers	Ausubel	-to improve lecture-type presentations -to promote meaningful content learning	-most areas where large amounts of of hierarchically related subject matter have to be related -when introducing new discipline, etc.	-middle and upper grades -may be adapted for use with younger children
Memory Model	Lorayne Lucas	-to improve memory skills -to enhance independent study skills	-all areas of the curriculum -with whole class, small groups, and individuals	-all grade levels
Cognitive Growth	Piaget Kohlberg Sullivan	-to provide stage appropriate learning experiences -to deepen and/or accelerate cognitive development	-all subject areas	-all age levels -most heavily utilized in lower and middle grades

FINAL NOTE

This document presented an overview of some relevant developmental theories, both, in the affective and cognitive sphere, as well as a brief summation of important instructional strategies.

The purpose of this paper was to provide the curriculum maker with a document which combined overview presentations of, both, theoretical views on aspects of development and on instructional strategies, in the hope that the side-by-side presentation of these two topics will lead to greater insight into the theoretical underpinnings of instructional strategies and therefore to a more enlightened selection and use of instructional technology.

It is believed, that the knowledge of the conceptual and philosophical base from which the various strategies sprung, allows the educator to make more appropriate use of instructional strategies, as well as to enable him/her to adapt the strategies to individual and situational needs.

It is believed that the overall quality of instruction is greatly enhanced if a relatively large variety of strategies is utilized not only since each strategy illuminates the curriculum content from a different viewpoint, but also because the use of a variety of strategies takes into account that different students have different learning styles.

Finally, a clear understanding of relevant developmental theories and existing instructional strategies may provide the experienced educator with the background to develop new strategies.